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ABSTRACT

One of a series of eleven curriculum manuals which cover the four transportation topics of public transportation, transportation and the environment, transportation safety, and bicycles for elementary, secondary, and adult levels, this manual covers the transportation and the environment topic for grades 9-12. It contains forty-four learning activities grouped into eight mini-units. Each mini-unit consists of a lesson plan component and an individual learning activities component. The first mini-unit provides a survey of issues related to transportation and the environment; the rest are as follows: learning about the interrelationships between transportation and the environment, learning about the automobile's effects on the environment, identifying solutions to conflicts between transportation and the environment, taking personal actions to resolve conflicts between transportation and the environment, examining the theory of and engaging in citizen participation to resolve conflicts between transportation and the environment, and researching issues related to transportation and the environment. A final section offers additional activities that may be used to evaluate or supplement evaluation of an activity or mini-unit. Also included are references for further study resources and masters for reproduction of role profiles, game boards, maps, and other distributable materials. (A curriculum guide, CE 014 028, is also available for use with the manuals.) (TA)

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TRANSPORTATION AND THE ENVIRONMENT IN HARMONY

MINI-UNITS AND LEARNING ACTIVITIES

for

grades 9 through 12

by

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CE 014 030

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FOREWORD

TEACHING TRANSPORTATION: AN OVERVIEW

> Nearly everything Americans do, from mailing a postcard to walking on the moon, depends on transportation. Transportation is essential for the supply of food, clothing and shelter, for national defense and employment, for education and recreation, for the international exchange of goods and services.*

While every American is provided with the necessities and amenities of modern life through an intricate freight-carrying network, we think of transportation most readily in terms of moving people, not products, and for good reason. Millions of us commute to work every day by car, bus, train, or subway. Moreover, 21 million youngsters travel on school buses every day. Americans use a variety of transportation modes for other purposes, including shopping, recreation, tourism, and moving. The average family changes residence once every five years and makes use of one of the many thousands of for-hire companies that provide domestic surface transportation. In addition, Americans travel more than 1.7 trillion miles by passenger cars or trucks every year, while 250 trains cover 26,000 miles and service 484 communities, with more than 7 million people annually using the New York to Washington run alone. There are also 950 intercity bus companies whose 20,600 vehicles travel 1.1 billion miles each year, while commercial aircraft transport over 210 million passengers annually.

Americans are highly dependent on transportation services for recreation purposes, too. Not only are vehicles used to get to places of entertainment, many vehicles are themselves forms of recreation. For example, there are approximately 7.3 million registered boats in the country, not counting rowboats and canoes. Seven and one-half million motor homes, truck campers, and travel and camping trailers are on the roads. Snowmobiles, dune buggies, and home-built vehicles have become widespread in the past few years.

Americans also relax on two-wheeled vehicles: there are 100 million bicycles and nearly five million motorcycles in the country, many of which are used for commuting as well as recreation.

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*John Burby, *The Great American Motion Sickness*, Little, Brown and Co., (Boston: 1971), page 3.

The most frequently used form of transportation in the nation, however, is walking. We sometimes forget that pedestrians utilize the single most common mode of travel.

Finally, the overwhelming importance of transportation in our lives must be assessed not only in terms of movement of goods and people, but also in relation to the millions of jobs transportation provides. Transportation facilities and vehicles require manufacturers, builders, operators, and mechanics, while they also create thousands of employment opportunities in related industries, from foundries which produce steel for vehicles to insurance companies which provide automobile insurance to health care systems which treat travel-related injuries.

For all these reasons it is important for students to become aware of transportation as it affects their lives, to learn to be wise purchasers and users of transportation goods and services, and to develop skills to promote constructive use and appropriate expansion of all forms of transportation in their communities and beyond.

In particular, consumers should become informed about (1) improving and using public transportation, (2) harmonizing transportation with the environment, (3) understanding transportation safety, and (4) appreciating the importance of bicycling. By examining these four major topics, students will learn, for example: to identify the best methods for commuting to school and work; to travel, when possible, in ways which minimize adverse transportation effects on the environment; and to purchase and use transportation vehicles and facilities in the safest possible manner.

CURRICULUM MATERIALS AVAILABLE

This Manual is one in a series of volumes that treat the four transportation topics of Public Transportation, Transportation and the Environment, Transportation Safety, and Bicycles at different grade levels. These volumes were developed by Abt Associates Inc. under contract to the U.S. Department of Transportation, Office of Consumer Affairs. The following eleven Manuals and curriculum guide on transportation consumer education are currently available:

- TRAVEL ON! Mini-units and Learning Activities on Transportation for Grades K-3
- TRAVEL ON! Mini-units and Learning Activities on Transportation for Grades 4-6
- Transportation Consumer Education for Adults: Mini-units and Learning Activities
- PEDAL ON! Mini-units and Learning Activities on Bicycling for Grades 6-9
- PEDAL ON! Mini-units and Learning Activities on Bicycling for Grades 9-12
- RIDE ON! Mini-units and Learning Activities on Public Transportation for Grades 6-9
- RIDE ON! Mini-units and Learning Activities on Public Transportation for Grades 9-12
- GETTING THERE! Mini-units and Learning Activities on Transportation Safety for Grades 6-9
- GETTING THERE! Mini-units and Learning Activities on Transportation Safety for Grades 9-12
- Transportation and the Environment in Harmony: Mini-units and Learning Activities for Grades 6-9
- Transportation and the Environment in Harmony: Mini-units and Learning Activities for Grades 9-12
- Transportation Consumer Education: A Curriculum Guide for Grades K-12 and Adult

These volumes may be ordered from:

Abt Publications
55 Wheeler Street
Cambridge, Massachusetts 02138

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The Federal Highway Administration (FHWA)

The National Highway Traffic Safety Administration (NHTSA)

The U.S. Office of Education, Bureau of Occupational Education (USOE/BOE)

The Office of Environmental Affairs in the Department of Transportation

The Urban Mass Transportation Administration (UMTA)

The Federal Aviation Administration (FAA)

The United States Coast Guard

Many individuals within these agencies were very helpful in pointing out biases in the materials, errors of fact, and pedagogical weaknesses.

Despite the considerable assistance from these sources, only the authors are in any way responsible for errors, approaches, and biases in the final product.

Antonina Uccello, Director of the Office of Consumer Affairs in the U.S. Department of Transportation, who was responsible for this project, actively and very helpfully involved herself in it from beginning to end. Finally, we are happy to allocate a large share of the credit for the Manual to the constant availability, assistance, and suggestions of the two Contract Technical Monitors for the project, Lee Learner Gray and Marilee Cavender.

INTRODUCTION

WHAT'S IN THE MANUAL

Transportation and the Environment in Harmony, Grades 9-12, contains 44 learning activities grouped in 8 mini-units. Each unit has two components:

1. A *lesson plan* which provides a suggested day-by-day sequence of learning activities and goals
2. *Individual learning activities* which describe in detail how to implement the exercises suggested in the lesson plan

Eight spirit masters are also provided at the end of the Manual for use with seven different activities.

The first mini-unit provides a survey of issues related to transportation and the environment; the rest focus on specific aspects of transportation and the environment. The six activities in the survey mini-unit all reappear in subsequent units. Brief descriptions of all the activities in the Manual are provided on pages 11 and 12.

A final section of activities is called "Assessment Activities." This section offers additional activities that may be used to evaluate or supplement your evaluation of an activity or an entire mini-unit.

Also included at the end of the volume is a bibliography of suggested teacher and student materials.

HOW TO USE THE MANUAL

This Manual is designed as a resource volume of activities and background materials to be used in ways which are compatible with your needs and those of your students.

The mini-units and individual learning activities may be integrated into your curriculum at many points and to meet many purposes.

- In *consumer education* and *home economics,* the activities find a natural home in view of their treatment of transportation issues from the perspective of the consumer.
- In *social studies,* the activities enhance learning about one's community. They aid in understanding the importance of citizen participation in government, and they broaden the study of transportation itself.
- In *science,* the activities have a place because of the effect that transportation has on the environment.

- *Health and safety units* are obvious points of entree because of the manual's emphasis on pollution of the environment.

- *Language arts* skills are integral to all the mini-units, since the activities are designed to develop and reinforce students' capacities to listen, speak, write, observe, and analyze.

You will find that the introduction to each mini-unit sums up the rationale for teaching that topic in your classroom. After reading these mini-unit instructions, you will have the background for deciding which mini-unit or mini-units you will teach. In examining the mini-units, you should feel free to make substitutions or deletions in the mini-units and in the learning activities whenever this is necessary to meet your teaching objectives.

Here are several methods for adapting the mini-units and learning activities to teach transportation and the environment in your classroom.

You can read the lesson plans for all mini-units and *select one or more lesson plans* to integrate into your course. Having made your selection, read the detailed activity descriptions which follow the lesson plans for specific instructions on implementing the activities in the mini-unit or units you have chosen. This method of using the Manual is most appropriate if you wish to concentrate in some depth on one or more specific aspects of transportation and the environment.

If you prefer to provide your students with a survey of issues related to transportation and the environment touching on several aspects of the field, you can *implement the first mini-unit* which provides just this type of overview. For your own information, you may wish to skim the lesson plans for the other mini-units for additional materials that will enrich your survey presentation.

You can *develop your own mini-unit* consisting of activities that you select from several mini-units in the Manual.* If you wish to do this, read the capsule descriptions of each activity provided on the chart on the following pages. This chart will show you, at a glance, the teaching method and content of each learning activity offered in the Manual.

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*You can also have your students leaf through the activities and select ones they would like to pursue individually or in small groups.

MINI-UNITS AND ACTIVITIES

Mini-unit 1

Surveying issues related to transportation and the environment

Activity #	*Activity Description*	*Class Time (periods)*
1	Students define the field of study, "Transportation and the Environment."	½-1
2	Students identify the major effects transportation has on the environment and ways in which features of the environment sometimes affect travel.	½-1
3	Students discuss what actions private citizens can take in their personal travel behavior to reduce the harmful effects of automobile use on the environment.	½-1
4	Students play a game in which they select and defend solutions to problem situations in which they are personally affected by transportation or the environment.	1-2
5	Students discuss and evaluate actions the government is taking to reduce transportation's harmful effects on the environment.	½-1
6	Students discuss what kinds of citizen participation the public can engage in to balance the needs of transportation and the environment.	1
	Mini-unit 2	
	Learning about the interrelationships between transportation and the environment	
7	Students discuss the social and individual needs transportation meets.	1
8	Students identify the major effects transportation has on the environment and ways in which features of the environment sometimes affect travel.	½-1
9	Students observe noise, air, water, and visual pollution and benefits to the environment associated with transportation vehicles and facilities.	½-1
10	Students discuss ways in which features of the environment can create obstacles that interfere with travel safety, convenience, and enjoyment.	½-1
11	Students take field trips to place themselves in the position of people experiencing transportation's beneficial and harmful effects.	1½-2
12	Students play a card game that requires them to order into the proper sequence the origins of pollution, pollu[illegible]nts, and the effects of pollution associated with transportation.	½-1
	Mini-unit 3	
	Learning about the automobile's effects on the environment	
13	Students discuss the automobile's beneficial and harmful effects on the environment.	½-1
14	Students engage in one or more scientific experiments that illustrate transportation's harmful effects on the environment.	½-2
15	Students discuss the automobile's indirect effects on the environment.	½-1
16	Students identify the beneficial effects highways and roads can have on the environment by evaluating a local highway or road in these terms.	½-1
	Mini-unit 4	
	Identifying solutions to conflicts between transportation and the environment	
17	Students discuss one or more solutions to conflicts between transportation and the environment.	½-1
18	Students discuss and evaluate actions the government is taking to reduce transportation's harmful effects on the environment.	½-1
19	Students play a game in which they select and defend solutions to problem situations in which they are personally affected by transportation or the environment.	1-2
20	Students discuss when to engage in citizen participation to oppose a harmful transportation effect on the environment or a feature of the environment which interferes with travel.	1
21	Students discuss how increased use of public transportation and carpooling might help solve conflicts between transportation and the environment.	1½-2

Mini-unit 5

Taking personal actions to resolve conflicts between transportation and the environment

Activity #	Activity Description	Class Time (periods)
22	Students discuss what actions private citizens can take in their personal travel behavior to reduce the harmful effects of automobile use on the environment.	½-1
23	Students discuss America's alleged "love affair" with the automobile and how this may have affected patronage of public transportation.	½-1
24	Students examine their own attitudes toward changing their travel habits which will reduce transportation's harmful effects on the environment.	½-1
25	Students discuss when it is appropriate to object to someone's use of transportation which is having detrimental effects on the environment.	½-1
26	Students role play scenarios in which one person complains to another that his or her travel behavior is having harmful environmental effects.	1

Mini-unit 6

Examining the theory of citizen participation to resolve conflicts between transportation and the environment

27	Students discuss what kinds of citizen participation the public can engage in to balance the needs of transportation and the environment.	1
28	Students role play scenarios in which community residents or groups protest harmful effects of transportation on the environment and adverse effects some features of the environment may have on travel.	½-1
29	Students discuss when to engage in citizen participation to oppose a harmful transportation effect on the environment or a feature of the environment which interferes with travel.	1
30	Students discuss what environmental criteria should be considered in transportation planning which are designed to reduce transportation's harmful effects on the environment.	1-2

Mini-unit 7

Engaging in citizen participation to resolve conflicts between transportation and the environment

31	Students engage in citizen participation to reduce transportation's harmful effects on the environment or hindrances to travel caused by features of the environment.	2-6
32	Students analyze a current, planned or proposed highway or road construction project to balance travel needs with environmental safeguards and then present recommendations to appropriate authorities.	1-3
33	Students participate in a hearing on transportation's effects on the environment.	1½-4
34	Students develop and implement an educational campaign in their community on transportation's effects on the environment and obstacles to travel created by features of the environment.	2½-6
35	Students engage in volunteer work for organizations devoted to reducing transportation's harmful effects on the environment.	1

Mini-unit 8

Researching issues related to transportation and the environment

36	Students research the extent to which automobile service facilities consume land and provide employment in their community.	1½-3
37	Students research the effects of highway, road and other transportation facility construction on the displacement of persons, businesses, and community facilities.	2-3
38	Students take field trips to different agencies and individuals to learn about transportation's effects on the environment.	2-3
39	Students poll the public on its knowledge about and attitudes toward conflicts between transportation and the environment.	2-4
40	Students research the politics involved in citizen participation designed to balance the needs of transportation and the environment.	1½-3

Assessment activities

41	You and your students evaluate class interests in studying transportation and the environment.	½-1
42	Students evaluate the course.	½-1
43	You and your students evaluate student attitudes toward issues related to transportation and the environment.	½-½
44	Students respond to questions about issues related to transportation and the environment.	½-1

WHY TEACH ABOUT TRANSPORTATION AND THE ENVIRONMENT*

The Problems

American consumers are the purchasers and users of personal transportation goods and services amounting to nearly 124 billion dollars every year.

Transportation and the environment are in many respects in a state of conflict. Transportation vehicles and facilities cause damage to the environment:

- The motor vehicle is still a major pollutant of our air, even with improvements in the control of auto emissions.
- Heavy traffic congestion clogs roads and city streets (77 percent of the nation's workforce commutes to work every day by private automobile; more than 70 percent of these people drive alone).
- Eighteen percent of the nation's energy supply is consumed by motor vehicle transportation; and nearly 80 percent of this amount is for personal travel by car, truck, or bus. (Early 1976 figures indicated an increase in vehicle fuel consumption, reverting to patterns that had been prevalent before 1974 and 1975 when Americans reduced the vehicle fuel consumption in response to the immediate fuel crisis.)
- Motor vehicle use is responsible for much of the visual pollution of our countryside--billboards, litter, automobile junkyards, as well as many badly designed gas stations, parking lots, and bus stations.

Transportation vehicles and facilities also enhance or preserve the environment in numerous ways and make scenic areas more accessible to the public. These beneficial effects must be balanced against the damage transportation causes to the environment.

It must be remembered that the environment, in turn, can interfere with transportation:

- Natural obstructions to visibility, confusing traffic signs, and poorly designed roads are obstacles that hamper travel safety, comfort, and convenience.

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*For the purpose of this Manual we have defined "environment" broadly to include a wide variety of factors that interact with travel, including natural resources, residential patterns, land space, and visual obstructions. The concept includes both the natural environment and the man-made environment.

We must work to bring transportation and the environment into balance with one another by shifting emphasis from environmentally damaging forms of transportation to modes of travel which do not harm the environment unnecessarily.

The Solutions

The solutions depend on

- Federal and state governments--to promote balanced transportation by providing assistance for planning, development, and financing of improved transportation systems; to enact legislation which will lessen conflicts between transportation and the environment; and to encourage private industry to develop and promote vehicles that are more energy efficient and less polluting.
- Local transit authorities--to generate greater use of their services by making public transportation more accessible and attractive to the daily traveler.
- Citizens/consumers--to become informed of local transportation and environmental problems and participate in their solution.
- Classroom teachers--to guide students to a better understanding of the causes and effects of transportation and environmental problems, and of possible solutions. Classroom education and transportation consumer education can offer the student a unique opportunity to develop awareness and skills essential to acquire responsible transportation and environmental habits and to play a role in balancing the often conflicting needs of transportation and the environment in the community.

This Manual

This Manual focuses on developing consumer skills that are particularly appropriate to grades 9-12. The learning activities are designed to help do this:

- They stimulate students' awareness and understanding of *transportation and environmental issues* and provide information regarding the complex *interrelationships* between transportation and the environment.
- They teach about the *effects*--both good and bad--transportation vehicles and facilities have on the environment.
- They teach about the unique effects *automobiles and highways* have on the environment--both harmful and beneficial.

- They stimulate awareness and consideration of the critical needs transportation meets in contemporary American society, including the provision of *job opportunities*, and also the extent to which highways, roads, airports, and mass transit facilities *consume land* and displace residents and businesses.

- They teach about the ways in which some features of the *environment* can interfere with safe, convenient, and enjoyable *travel*.

- They promote the ability to *identify resolutions to conflicts* between transportation and the environment, including awareness of solutions to situations in which the students are or will be personally inconvenienced or endangered by harmful transportation effects on the environment.

- They stimulate students to *take actions* now or in the future in their personal lives to resolve conflicts between transportation and the environment, such as increasing their use of public transportation and carpools.

- They stimulate students to engage now or in the future in *citizen participation* designed to resolve conflicts between transportation and the environment.

- They develop students' awareness of the *political considerations* which can make it difficult to effectively balance the needs of transportation and the environment and of methods for overcoming these constraints.

- They introduce students to concepts of *planning transportation systems* and participation in transportation planning.

MINI-UNITS
AND
LEARNING ACTIVITIES

MINI-UNIT 1

SURVEYING ISSUES RELATED TO TRANSPORTATION AND THE ENVIRONMENT*

This first mini-unit is designed for instructors who may not have the time to devote to two or three of the more in-depth mini-units which follow and instead want to expose their students to a variety of issues related to transportation and the environment. This unit can also be used in conjunction *with* or as an introduction to one or more of the following units.

The unit focuses on two major issues associated with balancing the frequently conflicting needs of transportation and the environment:

1. Transportation's beneficial and harmful *effects* on the environment
2. *Actions* citizens can take to reduce those harmful effects

Major concepts treated in the unit include

- The field of transportation and the environment has several aspects, including ways in which use of transportation harms the environment; ways in which use of transportation benefits the environment; and ways in which the environment creates obstacles that interfere with the safety, convenience, or enjoyment of travel.
- The concept of "transportation" includes not only vehicles but also the facilities, such as highways and airports, which are needed to service vehicles.
- A knowledge of the interrelationships between transportation and the environment is necessary in order to balance the often conflicting needs of the two.
- There are several positive actions the public can take which will help reduce pollution and depletion of scarce energy resources resulting from excessive use of automobiles.
- Citizens need to be aware of the government's attempts to balance the needs of transportation and the environment in order to avaluate them and encourage the government to alter or expand its efforts in this direction.

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*The activities in this mini-unit are all selected from the other mini-units which follow.

- Citizens need to be aware of solutions to situations in which they are personally inconvenienced or endangered by transportation effects on the environment.
- Citizens need to decide for themselves when it is appropriate to engage in citizen participation to promote harmony between transportation and government.
- Citizens need to be discriminating when selecting actions which they hope will solve conflicts between transportation and the environment.

You can, of course, browse through the activities in the other mini-units and substitute one or more of them for those we have provided in this initial unit. You may find activities which are more appropriate to the needs of your particular students than the ones this unit recommends.

MINI-UNIT 1 LESSON PLAN

Surveying issues related to transportation and the environment

Activity #	*Activities*	*Class Time*
1	DESCRIPTION: Students define the field of study, "Transportation and the Environment." GOAL: To be aware of what the field of transportation and the environment encompasses.	½-1 period
2[a]	DESCRIPTION: Students identify the major effects transportation has on the environment and ways in which features of the environment sometimes affect travel.[a] GOAL: To know how transportation vehicles and facilities and the environment interact in positive and negative ways.	½-1 period
3[b]	DESCRIPTION: Students discuss what actions private citizens can take in their personal travel behavior to reduce the harmful effects of automobile use on the environment.[b] GOAL: To know what actions individuals can take in their personal travel behavior to reduce the adverse effects of automobiles on the environment.	½-1 period
4[c] Spirit Masters #1,#2,#3,#4	DESCRIPTION: Students play a game in which they select and defend solutions to problem situations in which they are personally affected by transportation or the environment.[c] GOAL: To be able to solve conflicts between transportation and the environment.	1-2 periods

[a]This activity also appears in Mini-unit 2.

[b]This activity also appears in Mini-unit 5.

[c]This activity also appears in Mini-unit 4.

MINI-UNIT 1 LESSON PLAN (CONTD.)

Surveying issues related to transportation and the environment

Activity #	*Activities*	*Class Time*
5[d]	DESCRIPTION: Students discuss and evaluate actions the government is taking to reduce transportation's harmful effects on the environment.[d] GOAL: To know how the government is attempting to balance the needs of transportation and the environment.	½-1 period
6[e] Spirit Master #5	DESCRIPTION: Students discuss what kinds of citizen participation the public can engage in to balance the needs of transportation and the environment.[e] GOAL: To know what types of citizen participation the public can engage in to promote harmony between transportation and the environment.	1 period

[d]This activity also appears in Mini-unit 4.

[e]This activity also appears in Mini-unit 6.

Total Class Time:
4-7 periods.

ACTIVITY #1

Mini-unit Topic: Surveying the Field

Approximate Class Time: ½-1 period

Capsule Activity Description: Students define the field of study, "Transportation and the Environment."

Goal:

To be aware of what the field of transportation and the environment encompasses.

Concepts Treated:

- The field of transportation and the environment has several aspects, including ways in which use of transportation harms the environment; ways in which use of transportation benefits the environment; ways in which the environment creates obstacles that interfere with the safety, convenience, or enjoyment of travel.
- The concept of "transportation" includes not only vehicles but also the facilities, such as highways and airports, which are needed to service vehicles.
- A knowledge of the interrelationships between transportation and the environment is necessary in order to balance the often conflicting needs of the two.

ACTIVITY

Begin the activity by indicating that different people probably have different ideas in mind when they refer to "transportation and the environment" and that if the class is to study this topic it has to agree on what this field of study constitutes. Ask students for definitions of the words "transportation" and "environment." For example, "transportation" might be defined as

> the process of moving people and products, including the vehicles used for carrying them *and* the facilities necessary to service these vehicles (such as gas stations, highways, airports).

"Environment" might be defined as

> all the man-made and natural objects and conditions which can affect and be affected by transportation, including energy resources, pollution, and land use.

Following this definitional exercise, indicate that the benefits transportation has conferred on society have been striking. (Refer to the Manual Introduction where these benefits are enumerated.) Then point out that some of these benefits have included enhancing the environment and making it possible for citizens to appreciate the environment, from cleaning up garbage to providing access to wilderness areas.

Indicate that transportation has also had harmful effects on the environment, and it is primarily these deleterious consequences which make a study of the field of transportation and the environment so important.

Move on to stress that a study of the relationship between transportation and the environment also includes research into ways in which some features of the environment can hamper transportation safety, ease, and pleasure--for example, when overhanging trees obscure visibility for automobile and truck drivers.

Conclude the activity by discussing how a narrow definition of "transportation and the environment" may deter society from reducing transportation's harmful effects on the environment and eliminating features of the environment which hamper travel safety, comfort, or pleasure. For example, it is difficult for people to rectify a problem if they don't recognize it as a problem because they haven't defined it as such.

Evaluation Method

Students describe the components of the field of transportation and the environment.

ACTIVITY #2*

Mini-unit Topic: Surveying the Field

Approximate Class Time: ½-1 period

Capsule Activity Description: Students identify the major effects transportation has on the environment and ways in which features of the environment sometimes affect travel.*

Goal:

To know how transportation vehicles and facilities and the environment interact in positive and negative ways.

Concepts Treated:

- Transportation has significant effects on the environment.
- Some of transportation's effects on the environment are beneficial while others are harmful.
- The environment can create obstacles which facilitate or hamper travel safety, convenience, and enjoyment.

ACTIVITY

Students indicate what they believe the major ways are in which (1) use of transportation vehicles affects the environment and (2) how features of the environment may affect travel safety, convenience, and enjoyment. List these on the blackboard.

After students have exhausted their ability to identify effects, you can check their efforts against the following:

1. Examples of transportation's harmful effects on the environment are air pollution, noise pollution, visual unsightliness, water pollution, litter, land misuse, energy consumption and depletion, displacement of people and businesses, and the solid waste disposal problems of junk.

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*This activity also appears in Mini-unit 2.

2. Examples of how use of transportation can benefit the environment are reducing stop-and-go traffic, providing access to parks, historic sites, natural environment areas, etc., fighting forest fires, crop spraying, viewing scenery, garbage collection, airlifting food to stranded livestock, forest seeding and fertilizing, weather control, insect control, pollution monitoring and visual attractiveness.

3. Examples of how the environment creates obstacles which interfere with travel safety, enjoyment, or convenience are litter, commercial signs, obstacles to clear vision (trees, curves, etc.), garbage dumps, and automobile junkyards.

Conduct a follow-up discussion on *why* students may have failed to mention all these effects. For example:

- Did they neglect to mention the energy shortage as it relates to transportation because they felt there was nothing they could do about it?
- Did they fail to mention noise pollution from vehicles because they live in a rural area?
- Are they unaware of how significantly noise affects some people?
- Did they fail to mention attractive scenery and natural environment areas made accessible by highways and vehicles because students do not think in terms of transportation's positive effects on the environment?
- Did they fail to note how freeways in cities, to the extent that they draw off traffic from city streets, reduce pollution by limiting stop-and-go traffic because the students have never realized that highways can reduce pollution?
- Did they fail to mention forest seeding and fertilizing from airplanes because they live in urban areas and are unfamiliar with farming and forestry practices?

Evaluation Method:

Students describe the major ways in which transportation vehicles and facilities and the environment interrelate for good and ill.

Variations and Supplementary Activities:

Students can identify and classify pleasant and unpleasant noises associated with transportation vehicles and facilities by keeping a log of the sounds they hear emanating from transportation sources, such as sirens, horns, engines, car tire squealings, and accidents. Students should be instructed to be aware of the following considerations in keeping their logs:

- They should be attuned to sounds not just from obvious vehicles like cars and airplanes, but also from less obvious transportation related sources like highway construction crews.

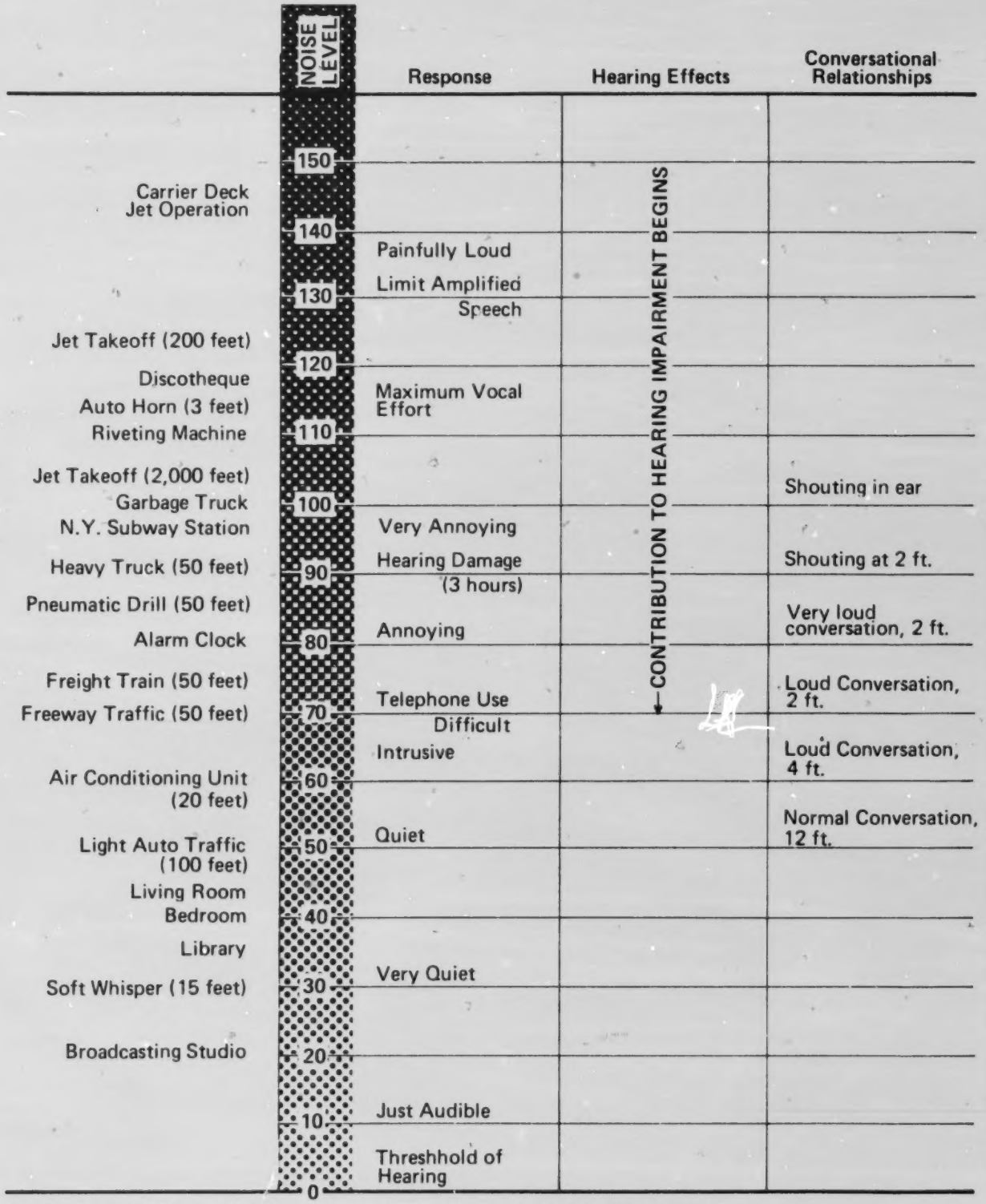
- They should try to notice if there are transportation sounds they do not "hear," like the humming of lights in a library or background music in a store, that nevertheless may have an effect on people.

- They should keep an eye out for modified or "souped up" vehicles that create noises which the original vehicle did not make.

The chart on the following page may be reproduced and used during the follow-up discussion to this variation.

Students can identify and discuss the beneficial ways in which aircraft are used in relation to the environment. One of the sections in Chapter III of this manual, "Readings on Transportation and the Environment," addresses this issue.

Sound Levels and Human Response



Source: *Noise Pollution*, U.S. Environmental Protection Agency, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

ACTIVITY #3*

Mini-unit Topic: Surveying the Field

Approximate Class Time: ½-1 period

Capsule Activity Description: Students discuss what actions private citizens can take in their personal travel behavior to reduce the harmful effects of automobile use on the environment.*

Goal:

To know what actions individuals can take in their personal travel behavior to reduce the adverse effects of automobiles on the environment.

Concepts Treated:

- There are several positive actions the public can take which will help reduce pollution and depletion of scarce energy resources resulting from excessive use of automobiles.
- Citizens need to pinpoint actions they can take to reduce automobile pollution that will benefit the environment the most.

ACTIVITY

Students write their response to the scenario below:

The Mayor has just appointed you Commissioner of Transportation and the Environment for your community. He has asked you to come up with a plan of action that lists the *actions individual citizens can take to (1) reduce the effects of auto emissions on the environment and (2) reduce the extent to which cars use up energy resources*. You have ten minutes right now in which to write a list of recommendations.

Break the class into small groups, instructing the members of each group to read each other's lists and discuss:

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*This activity also appears in Mini-unit 5.

1. Which actions you agree most citizens will voluntarily undertake and *why* you believe citizens would do so

2. Which actions citizens could be motivated to undertake, and *how* they could be motivated to do so

3. Why some citizens will not take some promising actions.

Groups report conclusions to the class and respond to questions and comments from you and the other groups. Raise for discussion any actions that students may have ignored:

1. Use public transportation whenever possible.

2. Use carpools and bicycles--and walk.

3. Maintain a car in optimum emission-reducing condition.

4. Use good driving habits, avoiding unnecessary emission-producing maneuvers (see the suggestions listed at the end of the activity).

5. Buy unleaded gasoline.

6. Buy cars with the lowest levels of emissions.

Evaluation Method:

Students describe the actions private citizens can take in their personal travel behavior which will help reduce the harmful effects of excessive automobile use on the environment and indicate why these actions will be effective.

GETTING THE BEST FROM YOUR GASOLINE

After you have selected the gasoline with the octane rating and the additives you need, as described in this publication, you can take several precautions to improve performance and save gasoline.

First, to improve performance:

- Shop for a good mechanic. Check your friends and neighbors to see if they know one who is a specialist on your car.

- If you have your car serviced at a large agency, get acquainted with the service manager and see if you can have the same mechanic service your car every time.

- Be sure that a careful service record is kept on all repairs, so that the mechanic knows what work has been done before, and when.

- Follow the recommendations in your Owner's Manual for major and minor service and tune ups.

Second, to save gasoline and conserve energy:

- Check your tire pressure at least once every month. Too low tire pressure increases rolling resistance, causes increased tirewear and reduces gasoline mileage.
- Periodically have your mechanic check the treadwear pattern of your tires to see if they are properly aligned. If they are out of alignment, the tires will wear excessively and your gasoline mileage will drop.
- If possible, avoid pressing your accelerator all the way down when climbing hills and long grades. It wastes gasoline.
- Avoid excessive high speed or jerky driving; learn to drive as smoothly and steadily as traffic and road conditions allow.
- Turn off your engine if you stop more than a minute. Restarting uses less gasoline than a minute's idling.
- Use the brake rather than the accelerator to hold your car in place on a hill.
- Jumpy starts and fast getaways can burn over 50 percent more gasoline than normal acceleration.
- Avoid weaving, spurting and lane changing in heavy traffic. Such practices waste fuel.
- Look ahead and pace yourself to minimize stops at traffic lights and jam-ups.
- Slow down. Excessive speed is the greatest waster of gasoline. For best mileage do not exceed 50 miles per hour.
- Limit the use of auto air conditioners and other fuel consuming accessories.
- If you get a sudden drop in gasoline mileage, check with your mechanic. Trouble is brewing, and the sooner you have it fixed the less it is likely to cost you.
- Before you buy a new car, ask the dealer how many miles per gallon you can expect. These figures are now available for most models.
- Reduce the number of unessential auto trips through careful trip planning.
- Use mass transit, carpools or bicycles when feasible.

ACTIVITY #4*

Mini-unit Topic: Surveying the Field

Approximate Class Time: 1-2 periods

Capsule Activity Description: Students play a game in which they select and defend solutions to problem situations in which they are personally affected by transportation or the environment.*

Goal:

To be enable to solve conflicts between transportation and the environment.

Concepts Treated:

- Transportation often affects people in personally disagreeable ways.
- The environment sometimes affects people's ability to travel safely, conveniently, or enjoyably.
- Citizens need to be aware of solutions to situations in which they are personally inconvenienced or endangered by transportation effects on the environment.
- Citizens need to be discriminating when selecting actions which they hope will solve conflicts between transportation and the environment.

ACTIVITY

Students in small groups (or as a class) respond in this game to hypothetical situations in which they are personally bothered by a transportation effect on the environment or by a feature of the environment which interferes with their ability to travel safely, conveniently, or enjoyably. Students select and defend solutions to the conflicts and are scored by other players on their choices and on their ability to defend their solutions.

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*This activity also appears in Mini-unit 4.

You will need to duplicate class sets of the *Solution Cards*, *Problem Situation Cards*, and *Score Sheets* so that each player receives a complete set (page) of eight *Solution Cards* and a *Score Sheet*. Each group of players also receives two *Problem Situation Sheets* (two sets of eight *Problem Cards*). All these playing materials are provided on Spirit Masters #1, #2, and #3.

The game is played by groups of three or four students. Playing instructions are provided on Spirit Master #4. You will want to review them with the class before the game is played.

Evaluation Method:

Game is self-evaluating.

Variations and Supplementary Activities:

The length of time for each step may be altered to suit different age and ability levels and different time constraints.

Students can develop their own problem situation and solution cards for subsequent game plays.

For each problem situation, students can discuss who *benefits* from the state of affairs and how they are benefited.

ACTIVITY #5*

Mini-unit Topic: Surveying the Field

Approximate Class Time: ½-1 period

Capsule Activity Description: Students discuss and evaluate actions the government is taking to reduce transportation's harmful effects on the environment.

Goal:

To know how the government is attempting to balance the needs of transportation and the environment.

Concepts Treated:

- A major solution to conflicts between transportation and the environment lies in government action to resolve such problems.
- The government is already attempting to balance the needs of transportation and the environment.
- Citizens need to be aware of the government's attempts to balance the needs of transportation and the environment in order to evaluate them and encourage the government to alter or expand its efforts in this direction.

ACTIVITY

1. Present examples of actions the Federal government is taking to reduce transportation's harmful effects on the environment, such as encouraging less reliance on automobiles through carpooling, emphasis on mass transit, and emphasis on funding for train travel.

Federal assistance for mass transportation began in 1961 with an emergency loan program and a small test and demonstration program. In 1964 the Urban Mass Transportation Act established a program of Federal matching grants for preservation, improvement and expansion of public transportation systems. Amendments to this Act have provided broader program goals, higher

*This activity also appears in Mini-unit 4.

funding levels, longer periods of assured Federal assistance and greater flexibility in meeting local needs. Funding increased from 50.7 million dollars in 1965 to 133 million dollars in 1970 to over 1.4 billion dollars in 1976 for the purchase and construction of mass transportation facilities.

The Federal-aid Highway Act of 1973 granted flexibility in the use of highway funds for public transportation purposes by opening Urban System funds (previously targeted solely for highways) to transit, both rail and bus; and by opening all highway funds to exclusive lanes for buses, traffic control devices, bus shelters, parking facilities, etc. In addition, interstate highway funds also were made available for non-highway public transportation purposes under certain conditions.

Significant steps toward rehabilitating the nation's rail system are now being taken as the result of new legislation providing 6.4 billion dollars in Federal aid to railroads. Key features in the law are the following provisions:

- Seven bankrupt Northeast and Midwest railroads are reorganized into the Consolidated Rail Corporation (ConRail), a freight railroad in which the Federal government is authorized to invest. The law provides 2.1 billion dollars for the start-up of ConRail.

- The Department of Transportation will upgrade rail passenger service in the Northeast Corridor. The five-year program will cost 1.75 billion dollars and will include improvements in tracks, stations, bridges, tunnels, signalling, and traffic control. In addition, there will be an expanded program of converting from diesel engines to electric engines; this will reduce pollution and save energy.

- A two-year program of subsidies is provided for bankrupt freight and commuter branch lines in the Northeast and Midwest. Without this subsidy program, these bankrupt lines could be discontinued because the new legislation has not made them part of ConRail. This provision offers 100 percent Federal financing for the first year of the subsidy and 90 percent for the second year.

- Another Federal program of assistance to branch lines is also established by the law, for a five-year period. This funding will be available to all states for the purchase or acquisition of bankrupt lines. This provision offers financing ranging from 100 percent for the first year to 70 percent for the fourth and fifth years.*

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*A fact sheet presenting full details on all provisions of the Railroad Revitalization and Regulatory Reform Act of 1976 is available from Office of Public Affairs, Federal Railroad Administration, Washington, D.C. 20590.

Other actions of the Federal government include enacting noise control legislation to reduce excess noise from snowmobiles, trucks, and airplanes and supporting and funding of highway beautification projects.*

2. Then give specific examples of programs the government is undertaking or has completed that are designed to achieve these objectives:

Grants to cities, towns, and counties for the purchase of public transportation vehicles, such as buses--for example, a grant of 474,852 dollars to the County of Hawaii to assist in the purchase of ten new passenger buses, bus signs, and related equipment.

Grants and contracts to organizations to research the feasibility of a variety of energy-saving and environment-protecting modes of travel--for example, an award of 150,000 dollars to the Massachusetts Institute of Technology to provide research on control procedures for Dial-A-Ride, a bus system in which people phone the bus system requesting the bus stop at their house.

Surveys to learn how transportation facilities and vehicles can reduce negative effects on the environment--for example, a survey to determine the potential for increasing transportation energy conservation by strengthening international cooperative research programs. This is an attempt to learn from nations that long ago adjusted to the problem of a limited energy supply, ideas that may be applicable in the United States. Interviews have been conducted with officials in France, West Germany, Sweden, Switzerland, and England.

Conferences in which national experts or officials are gathered together to discuss solutions for some of transportation's harmful effects on the environment--for example, a national conference that was held on the railroad's role in meeting the nation's energy requirements. The two-day meeting brought together members of both public and private interest groups as well as the academic community.

Guidelines and requirements for industry prescribing certain behaviors that will reduce transportation's effects on the environment--for example, the Federal Aviation Administration has recommended new ground operating procedures for jets at airports to reduce engine emissions and conserve fuel. It recommended that four-engine jets shut down one or two engines while taxiing to the terminal after landing or during protracted holds before takeoff. Three-engine jets would shut down one engine.

Passage of legislation limiting some of transportation's harmful effects on the environment--for example, a law requiring the installation of emission control devices on automobile exhausts and another reducing the speed limit to 55 mph. (Some of the other laws the government has passed that are designed to reduce transportation's harmful effects on the

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*See Chapter III in this Manual, "Readings on Transportation and the Environment."

environment are discussed in Activity #63 and in the Readings.) In another example, the Refuse Act of 1899 prohibits the throwing, discharging, or depositing og any refuse matter into the waters of the United States to a distance of three miles from the coastline. The Federal Water Pollution Control Act prohibits the discharge of oil or hazardous substances into the waters of the United States to twelve miles off shore. And boaters are required by law to notify the U.S. Coast Guard if their vessel or facility discharges oil or hazardous substances into the water.

Demonstration projects which the government funds to learn about the feasibility of methods for reducing transportation's harmful effects on the environment--for example, a 600,000 dollars carpool demonstration project in Los Angeles in which a computer program will provide computer-printed match lists to interested persons within a five-county area who fill out an application form. The project's goal is to remove 888,000 vehicles traveling the highways each day, save 170 millions of gallons of gasoline a year, and reduce by 71,000 tons the amount of pollutants put into the air in the area each year.

Efforts to reduce the effects of and the amount of noise pollution, for example:

- Passage of the Occupational and Safety Health Act which establishes a framework for regulating any and all workplace hazards including excessive noise exposure. Under this act, the Department of Labor and the Department of Transportation have both established regulations for drivers of commercial vehicles in terms of hours of service and noise levels generated by the vehicles at the operator station. For example, certain regulations pertain to the use of hearing protection devices for ground crews around military and commercial aircraft.

- Public Law 90-411 authorizes the Federal Aviation Administration to establish noise standards for aircraft. Such standards have been issued for a variety of new aircraft, resulting in quieter wide body aircraft such as the 747, DC-10, and L-1011 plus the development of quieting kits for existing aircraft such as the 727, 737, DC-9, DC-8 and 707. Regulations are also being established (1974) to regulate ways in which all aircraft are to operate in the vicinity of airports to reduce noise exposure to adjacent communities.

- The Federal Highway Administration has established noise standards for the design and citing of all new interstate highways and for the design and approval of projects to reduce the noise from existing highways.

- The Department of Transportation is directing research and development activities to demonstrate quiet trucks and quiet tires for all vehicles on the highways in order to reduce transportation noises.

3. Finally, discuss with students the following issues:

Does it seem that the Federal government's actions are effective?

Are there other actions the Federal government should be taking but isn't? If so, what are these actions? Why might the government not take these actions? What constraints may make it difficult for the government to take further action or to enforce the legislation it has enacted?

How can citizens help the Federal government to take effective actions to reduce transportation's harmful effects on the environment--for example, by attending hearings, by sending their opinions to the government agencies and by getting involved in regional transportation planning efforts?

Evaluation Method:

Students describe the actions the government is taking to resolve conflicts between transportation and the environment by role-playing dialogues between "newspaper reporters" and "government information officers" (government officials responsible for communicating government policies to the press and the public).

ACTIVITY #6*

Mini-unit Topic: Surveying the Field **Approximate Class Time:** 1 period

Capsule Activity Description: Students discuss what kinds of citizen participation the public can engage in to balance the needs of transportation and the environment.*

Goal:

To know what types of citizen participation the public can engage in to promote harmony between transportation and the environment.

Concepts Treated:

- Promoting harmony between transportation and the environment is often difficult.
- The public can engage in citizen participation which will effectively help balance transportation and the environment.
- Citizens need to decide for themselves when it is appropriate to engage in citizen participation to promote harmony between transportation and the environment.

ACTIVITY

Have students write what they would do to prevent the environmental problems described in one or more of the scenarios provided on Spirit Master #5.** Tell them for the time being not to consider whether they would or should take action, but to focus exclusively on what actions they *could* take which would be *effective* in solving the problems presented.

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*This activity also appears in Mini-unit 6.

**All but one of these scenarios uses the story line from the role plays provided at the end of Activity #28. In view of this repetition you may want to use only some of the scenarios. However, using the scenarios with this activity *and* using the role plays with Activity #28 will not detract from your teaching efforts because of the different instructional approaches these different activities use. Indeed, by discussing and role playing the same story dilemma, student learning may be reinforced if similar ideas are expressed, and expanded if ideas which were not expressed during the discussions occur during the role plays.

Read aloud several of the students' responses and record on the blackboard in outline form the major actions the students indicated they could take. Next, discuss for one or more of the proposed types of citizen participation:

- *Why* they would be effective
- Whether they would be *appropriate and justifiable* actions to take
- Whether most or any people when confronted with these scenarios in real life *would actually undertake* these actions and why

Conclude the activity by asking the class to consider the merits and disadvantages of the following potential types of citizen involvement:

Writing letters or engaging in petition campaigns directed at (1) such regulatory agencies (Federal, state, local) as the Environmental Protection Agency (EPA), Federal Aviation Adminstration (FAA), and Civil Aeronautics Board (CAB); (2) politicians, such as Congressmen, Senators, executives (e.g., President, mayor, governor, town manager); (3) local transportation agencies, such as mass transit authorities, port authorities, department of public works, department of highways; (4) state departments of transportation; (5) local consumer protection agencies; (6) media (TV, radio, newspaper) "action Lines"; and (7) letters to the editors of local newspapers. Such campaigns might be designed to achieve strong or stronger legislation on such issues as pollution controls for auto exhausts, strip mining, off-shore oil drilling, speed limits for cars, snowmobile use, auto traffic in the inner city, incentives for use of carpools, use of Highway Trust Fund and other sources for financing mass transit, high taxation or rationing of gasoline, closing airports after a certain hour in the evening, airport expansion, new highway construction, billboards, automobile litter, manufacture and purchase or large cars, mpg minimums for autos, free or inexpensive public transportation, construction of subways. Alternatively, such campaigns might be aimed at strict enforcement of existing pollution laws through fines, imprisonment, and legislation.

Engaging in volunteer work with national or local environmental organizations.

Creating publicity to educate the public on issues suggested above, by means of advertisements, editorials, and feature articles in local newspapers, monthly city magazines, newsletters of community groups and unions, etc.; lectures; fact sheets, leaflets, etc.; demonstration projects; and public service announcements on radio and television.

Giving talks to clubs and organizations--fraternal societies (Elks, Masons, etc.), youth groups (Boy/Girl Scouts, etc.), civic groups (Kiwanis, Rotary, etc.) may be effective public relations, as are *organizing meetings* with public and private officials and with government agencies and private companies to encourage them to adopt specific actions or discontinue current practices in order to reduce transportation's harmful effects on the environment.

Publicizing and organizing actions at one's place of employment, e.g., formation of carpools as company policy with an incentive system; provision of company shuttle bus to and from nearest public transportation facility during rush hour; subsidization of employee's transit fares and a fee for use of company parking facilities; and the provision of free parking for carpool drivers only.

Participating in transportation planning through such actions as becoming involved in the planning of Federal-aid highway projects or in the formulation of environmental impact statements. The Federal Highway Administration (FHWA) works with state highway agencies to ensure that community organizations and individual citizens are actively encouraged to participate in the planning and design of Federal-aid highway projects. Under the Federal aid program, state highway agencies initiate, plan, design, build, and operate highway projects. (The FHWA provides financial assistance and guidance and is responsible for certain key approvals.) Each state highway agency has formulated a community involvement program--part of the state's action plan--which explains the procedures that are followed.*

In addition to community involvement programs, each action plan explains how social, economic, and environmental factors are identified and studied, how the assistance of a wide range of professional skills is obtained and utilized, and how consideration of all feasible alternatives is assured in the highway planning process. Copies of action plans are available from state highway agencies or can be examined in their offices.

Action plan programs for community involvement include opportunities for interested citizens to participate in the planning and design process. In addition to public hearings, most states place emphasis on public meetings. Frequently such meetings are conducted as workshops, run with the assistance of local officials and agencies. In many instances coordination meetings are held with local officials prior to the public meetings. Under state action plans, mailing lists are maintained to provide early notification and continued information to known interest groups and individuals. Concerned citizens may contact their state highway agencies and ask to have their names placed on these mailing lists.

To ensure that environmental concerns and values are given systematic consideration equal to economic and technical considerations in the Federal decision-making process, the National Environmental Policy Act of 1969 (NEPA) requires each Federal agency to prepare a statement of environmental impact in advance of each major action, recommendation, or report on legislation that may significantly affect the quality of the human environment. Such actions may include new highway construction, harbor dredging or filling, nuclear power plant construction, large-scale aerial pesticide spraying, river channeling, new jet runways, munitions disposal, and bridge construction.

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*For further information see readings in Chapter III of this Manual and write for copies of *Getting Involved in Transportation* (U.S. Department of Transportation, Office of Consumer Affairs, 400 7th and D Streets, S.W., Washington, D.C. 20590) and *In Productive Harmony: Environmental Impact Statements Broaden the Nation's Perspectives* (U.S. Environmental Protection Agency, Washington, D.C. 20460).

Each environmental impact statement must assess in detail the potential environmental impact of a proposed action, and all Federal agencies are required to prepare statements for matters under their jurisdiction.

The statement's primary purpose is to disclose the environmental consequences of a proposed action, thus alerting the agency decision maker and the public to the environmental risks involved.

As early in the decision-making process as possible, and in all cases prior to agency decision, an agency prepares a draft statement for review by appropriate Federal, state, and local environmental agencies as well as by the public.

The impact statement procedure affords the public an opportunity to participate in Federal decisions that may affect the human environment. Each draft statement must be made public by the responsible agency at the time it is circulated for comment, a date not less than 90 days before the proposed action. Draft statements are announced in the *Federal Register*, published daily by the U.S. government, and subscribed to by some local public library systems, many university libraries, and most law libraries.

After comment from the agencies and interested parties, the statement is prepared in final form, incorporating all comments and objections received on the draft and indicating how significant issues raised during the commenting process have been resolved. Both draft and final statement are made available to the public.

Interested citizens may submit comments to agencies on any impact statement issued by them. If an individual believes a draft statement to be inadequate, he may offer written comments on the draft. If he believes the disposition of his comment in the final statement to be inadequate, he may so notify the agency involved.

In addition to these mechanisms for public participation, many agencies provide for public hearings not only at various stages during the performance of their statutory missions but during the impact statement process itself.

The importance of the role citizens play in the impact statement process has been recognized by the courts. In many cases, the courts have upheld the right, or standing, of citizens to sue on environmental grounds.

Participating in demonstrations, such as picketing, rallies, sit-ins, boycotts.

Initiating court action, such as civil action against any citizen, government agency, or government for violation or failure to enforce existing legislation--e.g., the Noise Control Act of 1972 or the Clean Air Act of 1970; and injunctions, through class action or personal suits, against industries and government agencies who pollute or plan to build or operate facilities that will have adverse effects on the environment.

Also discuss what constraints citizens must expect to cope with in attempting to take action, such as the positive effects of transportation on the environment, the social and personal needs transportation meets, and the human and economic costs involved in reducing or eliminating transportation's harmful effects on the environment. The goal of citizen participation is to resolve conflicts and create harmony among the conflicting priorities of society, transportation, and the environment.

Evaluation Method:

Students describe the types of citizen action the public can engage in which will effectively solve the conflicts presented in one of the scenarios on Spirit Master #3 which they did not use during the activity.

MINI-UNIT 2

LEARNING ABOUT THE INTERRELATIONSHIPS BETWEEN TRANSPORTATION AND THE ENVIRONMENT

Many transportation vehicles damage the environment, from automobiles to airplanes to snowmobiles. In addition, the environment can be affected by the by-products of transportation *facilities*, from highway construction noises to gas station odors. This unit treats the general effects these transportation vehicles and facilities have on the environment. This unit also involves students in examining the *beneficial* effects transportation has on the environment, often a neglected aspect of the field. The unit seeks to impress upon students that decisions about transportation and the environment must be made in the light of transportation's benefits to society and to the environment as well as in response to its damage to the environment.

Various features of the *environment* may also affect the safety, convenience, expense, and enjoyment of travel. This unit is designed to help students explore the relationship between transportation and the environment from this perspective, too.

In short, this unit promotes the major concept that there are many *interrelationships* between transportation and the environment and that the interaction between the two must be kept in mind in any attempt to balance the often conflicting needs of both.

Other important concepts treated in this unit include:

- Transportation serves a variety of essential purposes in contemporary American society.
- The critical needs transportation meets must be considered in deciding how to minimize or eliminate harmful transportation effects on the environment.
- Understanding the effects of transportation on the environment is promoted by putting onself in the position of people who are directly affected by transportation vehicles and facilities.
- There is a sequence involved in how transportation harms the environment that includes the vehicle or facility, the damaging agent, and the observable effects.
- Learning how transportation harms the environment can identify remedial measures which can help eliminate or reduce its harmful effects.

MINI-UNIT 2 LESSON PLAN

Learning about the interrelationships between transportation and the environment

Activity #	*Activities*	*Class Time*
7	DESCRIPTION: Students discuss the social and individual needs transportation meets GOAL: To be aware of the vast benefits transportation provides.	1 period
8[a]	DESCRIPTION: Students identify the major effects transportation has on the environment and ways in which features of the environment sometimes affect travel.[a] GOAL: To know how transportation vehicles and facilities and the environment interact in positive and negative ways.	½-1 period
9	DESCRIPTION: Students observe noise, air, water, and visual pollution and benefits to the environment associated with transportation vehicles and facilities. GOAL: To know some of the beneficial and harmful effects transportation has on the environment.	½-1 period, plus out-of-class time
10	DESCRIPTION: Students discuss ways in which features of the environment can create obstacles that interfere with travel safety, convenience, and enjoyment. GOAL: To know how features of the environment can hamper travel safety, convenience, and pleasure.	½-1 period

[a]This activity also appears in Mini-unit 1.

MINI-UNIT 2 LESSION PLAN (CONTD.)

Learning about the interrelationships between transportation and the environment

Activity #	*Activities*	*Class Time*
11	DESCRIPTION: Students take field trips to experience transportation's beneficial and harmful effects. GOAL: To know what some of the harmful and beneficial effects are which transportation vehicles and facilities have on the environment.	1½-2 periods
12	DESCRIPTION: Students play a card game that requires them to place into the proper sequence the origins of pollution, polluting agents, and the effects of pollution associated with transportation. GOAL: To know the causes and effects of transportation pollution on the environment.	½-1 period

Total Class Time:
4-7 periods.

ACTIVITY #7

Mini-unit Topic: Learning about Interrelationships

Approximate Class Time: 1 period

Capsule Activity Description: Students discuss the social and individual needs transportation meets.

Goal:

To be aware of the vast benefits transportation provides.

Concepts Treated:

- Transportation serves a variety of essential purposes in contemporary American society.
- The critical needs transportation meets must be considered in deciding how to minimize or eliminate the harmful effects of transportation on the environment.

ACTIVITY

Students discuss some of the social and individual needs transportation meets by identifying them in small groups and then listing them in order of importance.

Break students into small groups and instruct them to discuss and write briefly several *social* needs *modern* transportation meets and then several *individual* needs modern transportation meets. Provide one example of each. Then tell the groups to rank these functions transportation performs in order of priority--most important as "1," next most important as "2," and so on. If two or more are of equal importance, they can be numbered as "1a," "1b," and so on.

When discussions are over, reform the large class and conduct a follow-up discussion in which

1. The results of each group's discussion are reported to the class and a list is made on the chalkboard of the needs identified.

2. You add to the list any needs not mentioned by students, such as the need to get to and from work; the need for emergency transportation for

injuries, fire fighting, etc.; shipping needs for essential items (food, clothing, housing supplies, etc.) and desirable items (toys, luxury goods, etc.); tourism needs; recreational needs (for example, snowmobiles, motorcycles, bicycles); medical needs--dentist and doctor appointments; business travel needs; religious needs--assembling in churches; companionship needs--visiting relatives, friends, parties, dances, club meetings, etc.; the need for employment, through providing jobs in transportation services; and the need for national defense.

3. Then relate these essential and desirable needs modern transportation meets to the environmental problems some modes of transportation and some transportation facilities create, indicating that citizens (and government and industry) must balance these two sides of the equation when they conflict. For example, automobiles are a convenient method for many people to commute to work. Yet cars cause pollution and deplete energy resources. How can these two conflicting aspects of automobile use--satisfying an essential social and personal need (getting to and from work) and controlling transportation's pollution of the air and depletion of limited resources--be reconciled? Students discuss how they think such a dilemma should be resolved and raise other similar dilemmas for discussion.

4. Conclude by indicating that students must always consider the benefits transporation confers on society through the needs it meets before deciding what action, if any, to take to reduce transportation's harmful effects on the environment.

Evaluation Method:

Students describe the benefits transportation vehicles and facilities provide.

ACTIVITY #8*

Mini-unit Topic: Learning about Interrelationships

Approximate Class Time: ½-1 period

Capsule Activity Description: Students identify the major effects transportation has on the environment and ways in which features of the environment sometimes affect travel.*

Goal:

To know how transportation vehicles and facilities and the environment interact in positive and negative ways.

Concepts Treated:

- Transportation has significant effects on the environment.
- Some of transportation's effects on the environment are beneficial while others are harmful.
- The environment can create obstacles which facilitate or hamper travel safety, convenience, and enjoyment.

ACTIVITY

Students indicate what they believe the major ways are in which use of transportation vehicles affects the environment both positively and negatively and how features of the environment may affect travel safety, convenience, and enjoyment. List these on the blackboard.

After students have exhausted their ability to identify effects, you can check their efforts against the following:

1. Examples of transportation's harmful effects on the environment: air pollution; noise pollution; visual unsightliness; water pollution; litter; land misuse; energy consumption and depletion; displacement of people and businesses; and the solid waste disposal problems of junk.

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*This activity also appears in Mini-unit 1.

2. Examples of how use of transportation can benefit the environment: reducing stop-and-go traffic; providing access to parks, historic sites, natural environment areas, etc.; fighting forest fires; crop spraying; facilities for viewing scenery; collecting garbage; air-lifting food to stranded livestock; forest seeding and fertilizing; weather control; insect control; pollution monitoring; and visual attractiveness.

3. Examples of how the environment creates obstacles which interfere with travel safety, enjoyment, or convenience: litter, commercial signs; obstacles to clear vision (trees, curves, etc.); garbage dumps; and automobile junkyards.

Conduct a follow-up discussion on *why* students may have failed to mention all these effects.

- Did they neglect to mention the energy shortage as it relates to transportation because they felt there was nothing they could do about it?
- Did they fail to mention noise pollution from vehicles because they live in a rural area?
- Are they unaware of how significantly noise affects some people?
- Did they fail to mention attractive scenery and natural environment areas made accessible by highways and vehicles because students do not think in terms of transportation's positive effects on the environment?
- Did they fail to note how freeways in cities, to the extent that they draw off traffic from city streets, reduce pollution by limiting stop-and-go traffic because the students have never realized that highways can reduce pollution?
- Did they fail to mention forest seeding and fertilizing from airplanes because they live in urban areas and are unfamiliar with farming and forestry practices?

Evaluation Method:

Students describe the major ways in which transportation vehicles and facilities and the environment interrelate for good and ill.

Variations and Supplementary Activities:

Students can identify and classify pleasant and unpleasant noises associated with transportation vehicles and facilities by keeping a log of the sounds they hear emanating from transportation sources, such as sirens, horns, engines, car tire squealings, and accidents. Students should be instructed to be aware of the following considerations in keeping their logs:

- They should be attuned to sounds not just from obvious vehicles like cars and airplanes, but also from less obvious transportation related sources like highway construction crews.

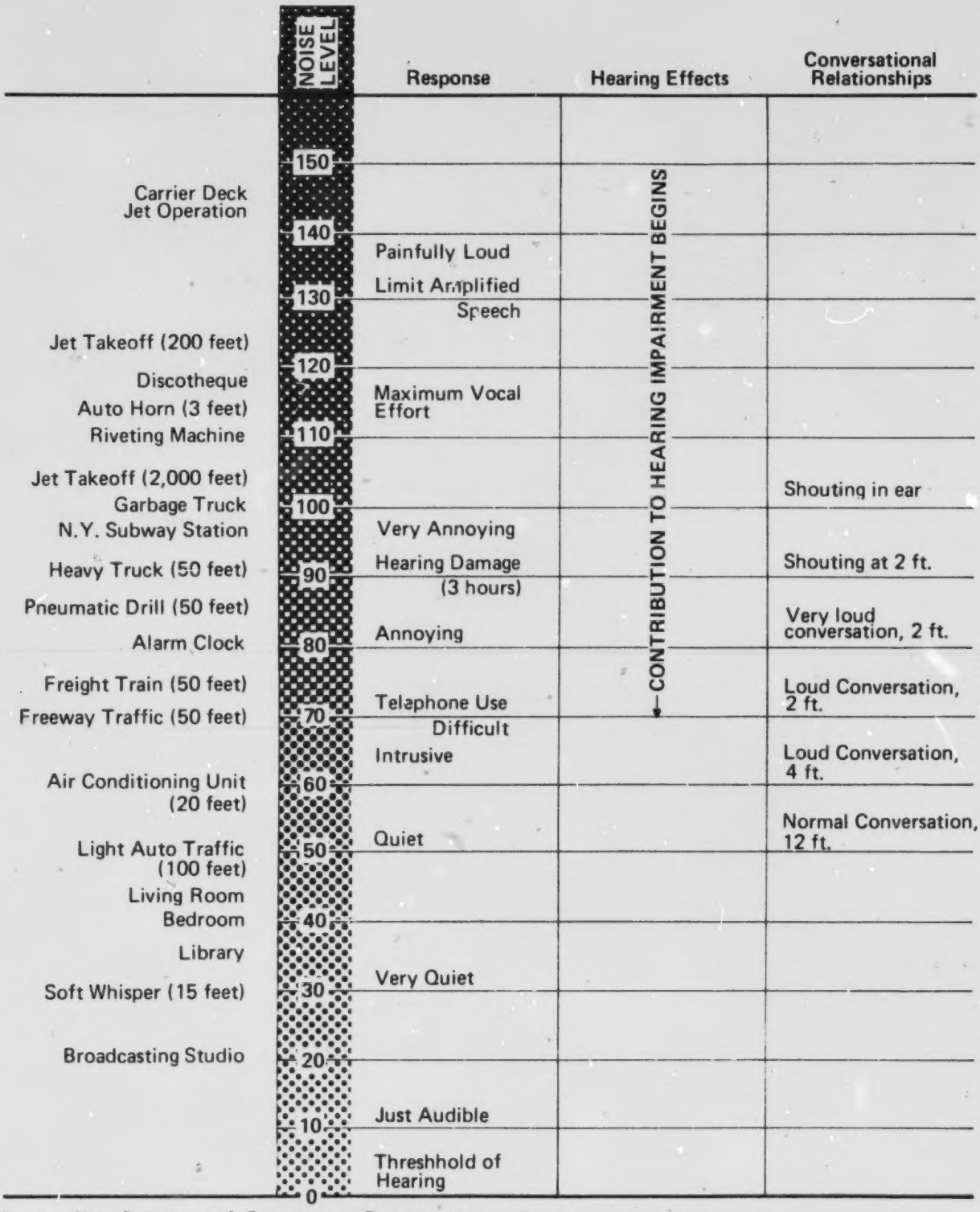
- They should try to notice if there are transportation sounds they do not "hear," like the humming of lights in a library or background music in a store, that nevertheless may have an effect on people.

- They should keep an eye out for modified or "souped up" vehicles that create noises which the original vehicle did not make.

The chart on the following page may be reproduced and used during the follow-up discussion to this variation.

Students can identify and discuss the beneficial ways in which aircraft are used in relation to the environment. One of the sections in Chapter III, "Readings on Transportation and the Environment," addresses this issue.

Sound Levels and Human Response



Source: *Noise Pollution*, U.S. Environmental Protection Agency, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

ACTIVITY #9

Mini-unit Topic: Learning about Interrelationships

Approximate Class Time: ½-1 period, plus out-of-class time

Capsule Activity Description: Students observe noise, air, water, and visual pollution. They discuss benefits to the environment associated with transportation vehicles and facilities.

Goal:

To know some of the beneficial and harmful effects transportation has on the environment.

Concept Treated:

- Transportation vehicles and facilities have both beneficial and harmful effects on the environment which can be readily observed.

ACTIVITY

Students keep a detailed written list of their observations of transportation effects on the environment for a given period of time, such as one day, two days, or a week.

Negative effects include loud airplane noise; automobile noises due to defective mufflers, accidents, modified or "souped-up" vehicles, "squealing" tires, horns, etc.; unpleasant exhaust smells from buses, trucks, cars, etc.; oily water due to boat accidents; and visual unsightliness (billboards, gas stations, parking lots, car "graveyards," etc.).

Positive effects include fighting forest fires; crop spraying; viewing scenery; garbage collection; airlifting food to stranded livestock; forest seeding and fertilizing; weather control; insect control; pollution monitoring; and providing access to parks and other natural environment areas.

After collecting observations, students read the results to the class, total the type and number of observations, and correlate them by transportation mode--cars, planes, etc. Class then discusses

- The possible good and bad effects some of these activities may have on people's physical and mental health

- Methods by which the harmful effects could be reduced or eliminated
- Any constraints that may make eliminating the harmful effects and preserving the beneficial effects difficult or expensive

Evaluation Method:

Students describe the major examples of transportation's beneficial and harmful effects on the environment which are included in their logs.

ACTIVITY #10

Mini-unit Topic: Learning about Interrelationships

Approximate Class Time: ½-1 period

Capsule Activity Description: Students discuss ways in which features of the environment can create obstacles that interfere with travel safety, convenience, and enjoyment.

Goal:

To know how features of the environment can hamper travel safety, convenience, and pleasure.

Concepts Treated:

- The environment can create obstacles which facilitate or hamper travel safety, convenience, and enjoyment.
- Students need to identify types of citizen participation the public can engage in which will help balance the needs of transportation and the environment when the two conflict.
- There are types of citizen involvement and actions that teenagers can engage in which can help promote harmony between transportation and the environment.

ACTIVITY

Conduct a class discussion on how features of the environment can interfere with travel safety, comfort, and pleasure. Focus on four areas of concern:

1. The concept of creating harmony between transportation and the environment
2. Ways in which features of the environment can affect travel safety, convenience, or enjoyment
3. Laws relating to features of the environment which affect travel
4. Methods by which citizens can reduce the impact of features of the environment which interfere with travel safety, convenience, or pleasure

Begin the discussion by pointing out that we commonly think of transportation and the environment only in terms of how transportation harms the environment whereas there are significant ways in which features of the environment can create obstacles to safe, pleasant, and comfortable travel. The goals of the citizen and of the government should be to identify the ways in which transportation and the environment affect *each other* and identify and support methods by which they can "live together" in harmony. This means that there will be times when transportation must be controlled or reduced to avoid or minimize some of its harmful effects on the environment, but also times when features of the environment must be altered so they do not hinder travel safety, convenience, and enjoyment. Conclude this introduction to the activity by reminding students that the concepts of transportation and environment must be interpreted broadly if harmony is to be promoted to the fullest extent possible.

> Transportation refers to the use and purchase of transportation goods and services, while "environment" includes all man-made artifacts as well as the natural surroundings.

Ask the class for examples of how features of the environment might hinder travel safety, convenience, and enjoyment. If your students have not yet driven a car, you can ask them to think of complaints their parents or older siblings may have made about how features of the environment interfere with their driving. Examples you can use to supplement the students' suggestions follow:

- *Commercial signs and billboards* can spoil scenery, reduce travel pleasure, and create distractions for drivers.
- *Automobile "graveyards"* can have the same effects.
- *Litter* can have similar effects and, in addition, create safety hazards for drivers and passengers in vehicles which swerve to avoid or skid on litter.
- *Distractions* along roads and highways, such as sunbathing areas, drive-in movie theatres with screens facing the highway, and athletic fields can cause accidents.
- *Interferences with visibility* such as trees, tree limbs, bushes, and hills can cause accidents.

Ask the class to indicate what laws, if any, should be passed to prevent these features of the environment from interfering with travel and present some of the legislation which now exists in this area, such as the Highway Beautification Act which regulates junkyard locations. (See Chapter III of this manual, "Readings on Transportation and the Environment.") In addition, other provisions of that act prohibit billboards within 660 feet of the right-of-way of Federal-aid interstate and primary highways outside commercial and industrial areas. The Federal-aid Highway Amendments of 1974 extend Federal control over outdoor advertising by prohibiting those signs, displays, and devices "erected beyond 660 feet from the right-of-way,

located outside of urban areas, of such size as to be visible" and "erected with the purpose of their message being read from such main traveled way." The Act provides for just compensation for the removal of the advertising lawfully erected under state law. Using 100 million dollars in funds from the Federal Highway Administration, the states removed 321,000 billboards from the nation's highways between 1971 and 1974.

Conclude the discussion by asking students to suggest ways in which citizens could become involved in reducing the environment's effects on transportation so that transportation and the environment can coexist. It will be useful at this stage to point out that all citizens can accept personal responsibility for their own *individual* actions--and that some citizens will want to go further and involve themselves in actions on a community level. Examples of personal and participatory citizen actions are provided in the activities in Mini-units 5, 6, and 7. Specific types of citizen participation you can present include keeping lakes and rivers free from pollution to ensure that recreational boaters are not disturbed by unsafe objects in the water and by visual unsightliness; not littering highways and waterways and encouraging others not to; discussing with neighbors ways in which their trees, bushes, etc., can be pruned or replanted if they present visual obstructions to automobile travelers, bicyclists or pedestrians; pointing out to the proper authorities any violations of Federal or local laws regarding the environment; participating in highway planning so that roads are built in ways that promote travel safety, convenience, and enjoyment. You may discuss with the class which, if any, of these actions teenagers can appropriately engage in and how they may do so.

Evaluation Method:

Students select an appropriate feature of the environment in their community and describe how it hinders travel safety, convenience, or enjoyment.

Variations and Supplementary Activities:

- Students can engage in one or more of the suggested citizen activities to eliminate a feature of the environment which hampers travel safety, convenience, or enjoyment.

- Students can interview highway officials and department of transportation officials on ways in which features of the environment hamper travel and on what citizens can do to maintain harmony between transportation and the environment.

- Students can research and discuss how effective the provisions of the Highway Beautification Act have been in removing billboards from highways and what obstacles delay its full implementation; such as foot dragging by states, opposition by the tourist industry, reluctance of the sign producing industry to cooperate in establishing a quick cost assessment system, and lack of concern on the part of the public and environmental groups.

ACTIVITY #11

Mini-unit Topic: Learning about Interrelationships

Approximate Class Time: 1½-2 periods, plus out-of-class time

Capsule Activity Description: Students take field trips to place themselves in the position of people experiencing transportation's beneficial and harmful effects.

Goal:

To know what some of the harmful and beneficial effects are which transportation vehicles and facilities have on the environment.

Concepts Treated:

- Transportation has impacts on the environment which directly affect people in both positive and negative ways.
- Understanding the effects of transportation on the environment is promoted by putting oneself in the position of people who are directly affected by transportation facilities and vehicles.

ACTIVITY

Small groups of students visit sites where transportation's effects on the environment are visible in order to experience the effects themselves. Groups begin by deciding what sites to visit. Sample sites are described on the following pages. Groups then determine for each site what observations they plan to make at the site. Sample questions to ask are also provided on the following page. Groups make travel and access arrangements with your assistance, as needed.

After conducting the field trips, groups meet to discuss their experiences and to answer the questions they posed at each field site visit. Part of the discussion should focus on the extent to which residents have a legitimate grievance if they became residents *after* the problem existed or have taken *no preventive measures* of their own. Groups prepare and present reports to the class describing their experiences. Groups respond to questions and comments from you and the other groups.

Evaluation Method:

Students write autobiographical sketches describing a day in the life of a typical resident or worker in one of the sites they visited focusing on the harmful and beneficial effect transportation vehicles and facilities have on him or her.

SAMPLE FIELD VISIT SITES AND QUESTIONS

In a residential area near an airport and over which planes take off and land, students can listen to noise, attempt conversation during it, attempt to listen to a portable radio during it and question passers-by about their reactions to the noise, including teachers and students at any nearby schools. Students can seek answers to such questions as:

1. Does the noise hamper communication? To what extent?
2. Does the noise cause discomfort? How much?
3. Does the noise make it hard to concentrate? To think?
4. How often does the noise occur?
5. Do residents seem (or say they are) bothered by it?
6. Did residents move into the area before or after the airport was built or expanded?
7. Have or could residents take any steps to try to reduce the noise--for example, plant trees or build walls?
8. Who benefits from the airport and how are they benefited? Do the benefits outweigh the adverse effects? Why?

In a residential area in which there are major, limited-access highways or busy roads travelled by cars and trucks at high speed, students can listen to the noise, attempt conversation or listen to a radio during it, and question people who live in abutting houses about their reactions to whatever noise and exhaust fumes may be evident. Standing in one place, students can seek to determine if the ground shakes as vehicles pass. Students can seek answers to specific questions such as the eight listed above and to the following:

9. Does the automobile exhaust make breathing unpleasant?
10. Do the vehicles shake the ground and the abutting homes?

On the shore of a lake frequented by motorboats, students can listen to the sounds of the motors and examine the water for oil and gasoline film. Students can seek answers to such questions as one through eight above. Residents living on the shore can be interviewed, as can bathers and boaters.

In a historic site, park, or other natural environment area which requires some form of transportation for access, students can seek answers to such questions as:

11. Could the public enjoy this area without the availability of convenient, safe, and inexpensive transportation facilities?

12. What are the estimated costs of the facilities and modes of travel necessary to reach the area?

13. Who takes advantage of the facilities to visit the area? Do all citizens participate equally?

In a section of town which has been relieved of traffic by the construction of a major highway, students can seek answers to such questions as:

14. What were conditions like before the highway was built?

15. What specific benefits has the highway provided the neighborhood--for example, fewer cars? More safety? Less pollution? Greater privacy?

16. Did the highway encroach on parkland? Did it replace residences?

In a facility responsible for fire fighting, crop spraying, forest seeding, insect control, weather control, or garbage collection, students can learn the ways in which the vehicles or facilities benefit the environment by going along to observe when fire fighting, garbage collection, etc., take place.

Near a rural highway, students can ask rural dwellers:

17. Did the highway cut off farmlands?

18. Did it allow greater speed in delivery of crops and supplies to and from the farmers?

ACTIVITY #12

Mini-unit Topic: Learning about Interrelationships

Approximate Class Time: ½-1 period

Capsule Activity Description: Students play a card game that requires them to place in the proper sequence the origins of pollution, polluting agents, and the effects of pollution associated with transportation.

Goal:

To know the causes and effects of transportation pollution of the environment.

Concepts Treated:

- Transportation has significant harmful effects on the environment.
- There is a sequence involved in how transportation harms the environment that includes the vehicle or facility, the damaging agent, and the observable effects.
- Learning how transportation harms the environment can help identify remedial measures which will help eliminate or reduce its harmful effects.

ACTIVITY

Students play a card game in which they must place in sequence different sources of pollution (e.g., cars), polluting agents (e.g., carbon monoxide), and pollution effects or consequences (e.g., lung health problems).

Break the class into small groups of no more than four students. Give each player a duplicated copy of the instructions that follow. Also give each group a copy of the pages of cards that follow. Each group, the first time the game is played, cuts out the cards and pastes them onto cardboard or 3 x 5 cards for durability.

Evaluation Method:

Game is self-evaluating.

INSTRUCTIONS FOR PLAYING TRANSPORTATION POLLUTION GAME

1. Cut out the cards and paste them on cardboard or 3 x 5 cards.

2. Shuffle cards and deal them to players, five cards to a player. Leave rest of deck face down on the table.

3. Game is then played like gin rummy. Each player draws one card from the deck and decides whether he wants to keep it. If he keeps it, he must discard another card. If not, he discards the card he picked. Discarded cards are placed face up, one next to the other.

4. If a player wants, he may take his turn by picking up a card from the discarded series of cards. However, in doing so he must also take into his hand all those cards that were discarded, including the one he wants. When picking up a discarded card or cards, the player must still discard one card before the next player takes his turn.

5. The object of the game is to group the cards in series of three that include (1) a cause or source of pollution, like cards, airplanes, buses; (2) a polluting agent or substance produced by the source of pollution that can cause damage, like carbon monoxide; and (3) a possible damage the polluting agent can cause, such as a health problem with the lungs. An example of a series of three cards that a player could group would be:

CARS, CARBON MONOXIDE, AND HEALTH -- LUNG PROBLEM.

6. Whenever a player groups a series of three cards, he earns three points. However, his group may be challenged if another player feels the series of cards is incorrect--for example, if two pollution effects are grouped, instead of just one. Such a challenge must be made before the next player takes his turn. Successful challenges earn the challenger two points; incorrect challenges earn the melder an additional two points, while the challenger loses two points. You can arbitrate challenges.

7. There are six cards with "WRITE IN YOUR OWN POLLUTION AGENT OR SOURCE" written on them. Players who draw these cards can write in any polluting agent or source but they must do so immediately before the next player takes his turn. Any meld with one of these cards is worth four points, instead of the usual three.

8. Game play ends when all cards are used up (an unlikely event) or when one player has grouped all his cards. At this time, players count up their points. Winner is player with highest number of points.

Possible Effects of Pollution	Polluting Agent	Cause or Source of Pollution
HEALTH - LUNG PROBLEM	CARBON MONOXIDE	CARS
POSSIBLE WEATHER CHANGES	AUTO EMISSIONS	CARS
HEALTH - LUNG PROBLEM	ASBESTOS PARTICLES FROM BRAKE LININGS	CARS
DIRTY CLOTHING	DIRT PARTICLES	CARS

Possible Effect of Pollution	Polluting Agent	Cause or Source of Pollution
HEALTH OF ZOO ANIMALS AND LIVESTOCK	CARBON MONOXIDE	CARS
HEALTH OF PLANTS AND TREES	CARBON MONOXIDE	CARS
HEALTH - LUNG PROBLEMS	HYDROCARBONS	CARS
UGLY SCENERY	BILLBOARDS	CARS

Possible Effect of Pollution	Polluting Agent	Cause or Source of Pollution
DIFFICULTY HEARING PEOPLE, TV, AND RADIO	NOISE	AIRPLANES
DIFFICULTY HEARING PEOPLE, TV, AND RADIO	NOISE	TRUCKS
STRESS	NOISE	MOTORCYCLES AND CARS WITHOUT MUFFLERS
DIRTY WATER	OIL AND GASOLINE	BOATS

Possible Effect of Pollution	Polluting Agent	Cause or Source of Pollution
DIRTY CLOTHING	DIRT PARTICLES	AIRPLANES
FORCING PEOPLE TO MOVE	ROAD BUILDING	CARS
POSSIBLE DEAFNESS	NOISE	AIRPLANES
DIFFICULTY SLEEPING	NOISE	AIRPLANES

Cause or Source of Pollution / Polluting Agent / Possible Effect of Pollution				
WRITE IN YOUR OWN POLLUTION AGENT OR SOURCE	WRITE IN YOUR OWN POLLUTION AGENT OR SOURCE	LITTER	DISPOSING OF JUNK - WHERE TO PUT IT
WRITE IN YOUR OWN POLLUTION AGENT OR SOURCE	WRITE IN YOUR OWN POLLUTION AGENT OR SOURCE		
WRITE IN YOUR OWN POLLUTION AGENT OR SOURCE	WRITE IN YOUR OWN POLLUTION AGENT OR SOURCE		

MINI-UNIT 3

LEARNING ABOUT THE AUTOMOBILE'S EFFECTS ON THE ENVIRONMENT

This mini-unit treats the most important single cause of environmental pollution--the automobile. The automobile, however, is in many ways the vehicle which most enhances our ability to enjoy the very features of the environment which it so profoundly damages. Given this striking interaction between the automobile and environment, it seems appropriate to provide a separate mini-unit which focuses exclusively on this relationship.

This unit also closely examines the indirect effects automobiles have on the environment, including the use of considerable land for highways and roads and the visual effects of highways, billboards, and litter.

Finally, the unit promotes the development of decision-making skills among students in terms of balancing the conflicting demands of the automobile and the environment. Specifically, the unit helps students to assess:

- The relative positive and negative impacts on the environment that are created by highways and roads
- The seriousness and extent of the automobile's damage to the environment
- The ways in which highways improve not only travel safety, speed, and convenience but also provide jobs and stimulate the economy

MINI-UNIT 3 LESSON PLAN

Learning about the automobile's effects on the environment

Activity #	*Activities*	*Class Time*
13	DESCRIPTION: Students discuss the automobile's beneficial and harmful effects on the environment. GOAL: To know the automobile's beneficial and harmful effects on the environment.	½-1 period
14	DESCRIPTION: Students engage in one or more scientific experiments that illustrate transportation's harmful effects on the environment. GOAL: To know some of the harmful effects transportation can have on the environment.	½-2 periods
15 Spirit Master #6	DESCRIPTION: Students discuss the automobile's indirect effects on the environment. GOAL: To know what indirect effects automobiles have on the environment.	½-1 period
16	DESCRIPTION: Students identify the beneficial effects highways and roads can have on the environment by evaluating a local highway or road in these terms. GOAL: To be able to evaluate the relative beneficial and harmful effects highways and roads have on the environment.	½-1 period

Total Class Time:
2-4 periods.

ACTIVITY #13

Mini-unit Topic: Learning the Automobile's Effects

Approximate Class Time: ½-1 period

Capsule Activity Description: Students discuss the automobile's beneficial and harmful effects on the environment.

Goal:

To know the automobile's beneficial and harmful effects on the environment.

Concepts Treated:

- The automobile has provided extensive services and will continue to do so.
- The automobile has positive effects on the environment.
- The automobile has several negative effects on the environment.
- People who do not drive nonetheless benefit and are harmed by automobile travel.

ACTIVITY

Begin the activity by asking students to identify some of the major ways in which the automobile provides important and even indispensible services to people, including:

- Opportunities to visit people who live some distance away
- Quick transportation in an emergency
- Access to jobs and entertainment
- Opportunities to shop where prices may be cheaper or the quality of goods may be higher

Then focus on some of the positive effects cars have on the environment, including:

- Enabling the public to view scenery

- Enabling people to visit parks, historic sites, and natural environment areas (which otherwise might be inaccessible to most people)

If your students do not yet have driver's licenses, you might ask them to discuss how many of the positive functions that automobiles provide benefit people, like themselves, who do *not* drive.

Finally, have students discuss the harmful effects automobiles have on the environment, supplementing their ideas with the following, as needed:

1. Air pollution, affecting health and foliage

2. Noise pollution, affecting health, communication, concentration and sleep

3. Visual pollution, such as billboards, signs, gas stations, automobile junkyards and litter

4. Energy depletion

For supplemental information about these effects, you can read or reread the appropriate sections in Chapter III of this Manual, "Readings on Transportation and the Environment."

Conclude the activity by noting that facilities which are built to make automobile travel possible--notably, highways and roads--have major positive and negative impacts on the environment and that these aspects of the problem are discussed in Activity 16.

Evaluation Method:

Students describe the beneficial and harmful effects automobiles have on the environment and justify their evaluations.

ACTIVITY #14

Mini-unit Topic: Learning the Automobile's Effects

Approximate Class Time: ½-2 periods

Capsule Activity Description: Students engage in one or more scientific experiments that illustrate transportation's harmful effects on the environment.*

Goal:

To know some of the harmful effects transportation can have on the environment.

Concepts Treated:

- Transportation vehicles have many easily demonstrable harmful effects on the environment.
- There is sometimes debate regarding the seriousness of these effects on the environment.

ACTIVITY

The effects of car exhaust pollution on clothing

Materials Needed:

Iron
Ironing board
Nylon stockings
35-mm photoslide holder
Slide projector

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*These science experiments were developed for this activity by a secondary school science teacher, Donald Bockler, Belmont, Massachusetts. This activity involves some experiments which may involve killing or injuring plants or animals. You or your students may feel that it is wrong for ethical or educational reasons to kill living things in a course designed to motivate students to protect the environment--or at any time. If you or your students feel this way, you may want to simply describe what the results of the experiment would be if you performed it and then discuss with your students when and if such experiments are appropriate.

Students iron 1½-inch squares of single-mesh nylon (from old nylon stockings, not from stretch pantyhose type) in the middle of a "Readymount" 35-mm photoslide holder. Different slides of the same type should be placed in various locations where traffic is heavy (such as gasoline station garages, busy street corners, bus stations, airports, and train depots), on residential street corners, and in the rural countryside. The slides should be labelled with the name of the school, student location, and date.

After 10 days of contamination, the slides are brought back into the classroom and projected onto a screen and "breaks" in the nylon can be counted and compared with an initial count. The slides can be taken back to their pollution sites and allowed to sit for another 10 days, if time allows. Results then may be presented in a table or graph.

Students then discuss the relative deterioration of nylon in the different areas and the role of transportation in creating air pollution.

Variations

- Slides may be placed directly underneath different cars and buses for a more specific study of the different modes of transportation.
- Different thin, net materials may be tested.

Particulate pollution from vehicles

Materials needed:

Petroleum jelly
Microscope slide
Transparent metric ruler

Students coat a thin layer of petroleum jelly on one side of a microscope slide and hang or place the slide in various locations where traffic is heavy (such as gasoline stations, bus and subway stations, train depots, busy street corners), on residential street corners, at airports, in the rural countryside, or simply outside of the classroom window or on the roof.

After 10 days, the slides are examined under a microscope and the relative numbers of particles per square millimeter or per microscope field are counted and recorded. The number of square millimeters of a microscope field may be measured by placing a transparent metric rule under a microscope to measure the diameter of the field. The area of the field may then be computed by using the formula

$$\text{Area} = \pi\ (\text{Radius})^2$$

Students discuss the roles of automobiles, buses, etc. in releasing particulate matter into the air and possible health consequences and cleaning bills.

Effects of sunlight on gasoline

Materials needed:

Ozone/ultraviolet lamp
Small clear box or cutaway shoe box and cellophane
Saucer
Tablespoon
Gasoline

Place an ozone/ultraviolet lamp inside a small clear box or a cutaway shoe box with a cellophone or plastic top along with a saucer with one tablespoon of gasoline. Turn on the ozone lamp and observe the following petrochemical reaction:

$$O_2 \xrightarrow{\text{Ozone lamp}} O_3 \text{ (Ozone)}$$

$$O_3 + \text{Gasoline} \longrightarrow \text{Aerosol smog}$$

Students relate this reaction to the effect of the sun's ultraviolet rays on gasoline from motor vehicles.

Variations

- The ozone lamp may be used to test the effects of ozone on rubber (e.g., pieces of automobile tire) over time.
- An introduction coil producing a continuous spark may be used in place of the ozone lamp in experiments involving flammable gasoline.

Effects of sulfur dioxide, emitted by car exhausts, on plant life

Materials needed:

Two identical plants
Two large, wide-mouth jars
2 ml of 5 percent sulfuric acid
2 gm sodium sulfite

Students put two identical plants, such as geraniums, inside of two large (at least one gallon), wide-mouth jars which can be sealed air tight. Insert a small container with 2 ml of 5 percent sulfuric acid (H_2SO_4) next to one of the plants in one of the jars. Carefully add 2 gm of sodium sulfite (Na_2SO_3) to the sulfuric acid and seal the top of the jar. Seal the second jar without adding any extra chemicals to the plant or jar. This will serve as a control. Observe and record the appearance of the plants before the experiment and each day for the next few days.

Students then discuss the causes and effects of sulfur dioxide pollution, in particular the effect of automobile exhaust on plant life. Class discusses how things that affect plants might also affect animals and human beings.

Variations

- A large plastic bag may be used in place of the jar if all holes are sealed with tape and the opening of the bag is taped shut.
- Small animals could be tested instead of plants. Animals such as sowbugs, grasshoppers, earthworms, snails, frogs, and mice make good subjects.

Effects of gases commonly found in emissions from transportation vehicles on living and nonliving materials

Materials needed:

Wide-mouth jars
Gases: sulfur dioxide, ozone, hydrocarbons, nitrogen dioxide
(See materials to be tested at end of experiment.)

Students suspend or place objects inside of an air-tight test chamber in which gases such as sulfur dioxide (SO_2), ozone (O_3), hydrocarbons, nitrogen dioxide (NO_2), and carbon monoxide (CO) have been placed. The gases should *always* be introduced under a fume hood to prevent harm to the students. These gases are available in cylinders from many chemical supply houses. The air-tight test chambers can be wide-mouth jars with good, reliable tops, glass aquaria, or bell jars. Gas concentrations may be controlled by using gas sampling detector tubes, such as Eduquip Gas Sampling Kit, available from various supply houses. Gas concentrations best tested in this study would be as follows:

SO_2	=	1 ppm (part per million) for 1 hour
O_3	=	0.25 ppm for 30 minutes
NO_2	=	0.25 ppm for 1 hour
CO	=	120 ppm for 1 hour
Hydrocarbon	=	900 ppm for 1 hour

Materials to be tested in these test chambers:

1. Metal alloys - aluminum, copper, brass, silver, steel, zinc
2. Rubber - tires, rubber bands
3. Fabrics - cotton, wool, nylon, silk (dyed or undyed)
4. Paints, stains, varnishes
5. Plants - onion, rose, lettuce, bean, clover, tomato
6. Fungi - mushrooms, mold, yeast
7. Animals - fruit flies, sowbugs, earthworms, ants

Variations

- Time and concentration of gases may be varied.
- Combinations of different gases may be tested.

Concentration of carbon monoxide in an area of high transportation vehicle density

Material needed:

Detector tubes

Students sample and determine the concentration of carbon monoxide emissions in such areas as: bus and subway stations, train depots, gasoline stations, busy street corners, quiet residential areas, rural countryside, and airports. Carbon monoxide detector tubes (e.g., Eduquip Gas Sampling Kit) are available from chemical supply houses. Samples of air are taken into the gas detector tubes and the specific concentration of gas is identified by a color change in the tube.

Students discuss and account for the variations observed in the different locations.

Variations

- Sample emissions from automobiles with air pollution controls can be compared to those taken from cars without air pollution controls.
- Students can alter the idle speed of an automobile and test exhaust for carbon monoxide changes.

Effects of gasoline or oil spills in freshwater plants and animals

Materials needed:

10-gallon (or larger) aquarium
Fresh-water fish
Plants
Gasoline
Motor oil

Students set up a 10-gallon (or larger) aquarium with various common freshwater fish (guppies, goldfish) and plants (Elodea, sea grass, algae). Then a few drops of gasoline are placed on the water, representing a spill from a power boat. Observations are made of any changes in normal growth and behavior patterns.

In another aquarium, or the same one at a later date, a few drops of motor oil are placed on the water. Observations and comparisons are made between various spills and their effects.

Variations

- The "oil spill" could be made on a small lagoon in a lake and changes in plant and animal life could be noted by sampling at various intervals.
- Samples of plant and animal life could be taken from an area near a busy dock and compared with samples taken from a similar area where light boat traffic occurs.

Oil absorption abilities of various materials

Materials needed:

Oil
Water
One-square-foot trays
Hay
Cloth
Newspaper
Paper towels
Sponge
Weighing scales

Students pour oil on top of water in trays of at least one square foot until the surface is just covered. Equal amounts of oil should be poured into equal size trays of water for each material to be tested. Students then try to absorb all of the oil using such materials as hay, pieces of cloth sheets, newspaper, paper towels, sponge, and whatever other materials that they can think of. As much material should be added to the tray as is needed to absorb all of the oil. The material is then set aside and weighed to find out how much material was needed to absorb the oil. The weights and relative absorption abilities can then be compared. Results can be discussed in terms of difficulty in removing oil slicks from beaches and shore line left by boats.

Sound-deadening characteristics of an automobile muffler

Materials needed:

New automobile muffler
Old automobile muffler
Microphone (optional)
Oscilloscope (optional)

Students produce a loud sound of a known and repeatable quality and pass this sound through a new muffler and an old, discarded muffler. The muffled sound is then compared with the original sound in both cases. A microphone connected to an oscilloscope can be used to compare the initial and final sounds quantitatively.

Variations

- The needle for volume on a good hi-fi amplifier or tape recorder can be used to compare relative sounds.
- A decibel meter can be used to find out the exact intensities of the sounds.
- New and worn-out mufflers can be opened up to investigate muffler sound baffles.

Noises produced by transportation vehicles

Material needed:

Decibel meter

Students measure the noise produced by an automobile pulling away from a curb and compare this noise to a bus pulling away from a curb and a subway pulling away from its stop. (The noise can be measured using a decibel meter).

Students should discuss the relative amounts of noise produced by each mode of transportation and determine the amount of noise produced per person being transported. For example, if a bus can carry the same number of people as 30 automobiles, cars create the most noise pollution per passenger transported.

Variation

- Students may record the sounds on tape and analyze them later on such school equipment as an oscilloscope.

You can conclude the activity by pointing out that there is some disagreement among the experts over how much or how serious the damage is which transportation vehicles cause to the environment. Ask your students to discuss how serious they think these effects are, based on the results of their experiments. Ask them to decide whether their experiments have provided them with enough information to assess the extent and seriousness of transportation's harmful effects on the environment.

Evaluation Method:

Students describe how their experiments illustrate the harmful effects automobiles have on the environment.

ACTIVITY #15

Mini-unit Topic: Learning the Automobile's Effects

Approximate Class Time: ½-1 period

Capsule Activity Description: Students discuss the automobile's indirect effects on the environment.

Goal:

To know what indirect effects automobiles have on the environment.

Concepts Treated:

- The automobile has many major indirect effects on the environment, some are beneficial and others are harmful.
- The most important indirect effects of automobiles on the environment are caused by highways and roads.
- While highways have significant harmful effects on the environment, people also need to be aware of the ways in which highways improve travel safety, speed, and convenience, and the role of highways in providing jobs and stimulating the economy.

ACTIVITY

Students in small groups identify and evaluate the automobile's indirect effects on the environment. Prior to class, students write their response to the scenario provided on Spirit Master #6. Then break the students into small groups and give them written instructions to read each other's papers and to:

1. List the items you wrote about that exist solely or primarily for the support of the automobile. (Examples include gas stations, home garages, parking lots, signs, streets, and highways.)
2. Can you think of any other facilities that are needed to service the automobile?
3. Discuss the indirect effects that each facility has had on the environment in your community.
4. Discuss the role each facility plays in servicing automobiles.

5. Discuss how prevalent or widespread each of these facilities is--how many there are in your community.

6. Discuss these facilities in terms of what positive effects, if any, they have on the environment. Are they interesting or attractive to look at, (for example, well designed bridges, aesthetically built highways, tastefully landscaped roads, architecturally appealing gas stations or subway stations)? Do they contribute to the cleanliness or orderliness of the neighborhood? Do they make possible or facilitate travel to parks, historic sites, or other natural environment areas? Do they remove traffic from the city? Do they involve garbage collection or crop spraying? Are any of the facilities unpleasant to look at (for example, automobile junkyards, ugly or unclear gas stations, grotesque bridges, monotonous highways)? Do they discourage travelers from using less polluting forms of transportation? Do any of these facilities present dangers to the community (for example, injuries to children roaming the streets or junkyards, visibility hazards, distractions to drivers)? Are there other important ways the land occupied by these facilities could be used in most communities (for example, parks, playgrounds, housing)?

6. Discuss the advantages of these facilities, aside from their necessity or desirability for safe, convenient, and pleasant automobile travel, such as the jobs they provide, their potential stimulus to the national economy, and their role in national defense.

After the groups have completed their discussions, have each group present its conclusions to the class and respond to questions from you and from other groups.

Evaluation Method:

Students describe the indirect effects automobiles have on the environment using their own community as an illustration.

Variation and Supplementary Activity:

Students can research the amount of time people spend commuting and what they do while commuting. Students can seek answers to questions such as the following:

- How much time does the average commuter spend in his or her car?
- Do commuters who travel by public transportation spend less time commuting?
- Do commuters on public transportation use the time to relax, read, chat, etc.? Do auto commuters?
- Does it appear that auto commuters could commute to work as well by public transportation as by car?

- Have highways relieved the severity of any rush-hour delays, traffic congestion, and pollution or have they created traffic jams of their own?

- Do automobile commuters have parking problems? If so, how are these handled?

- Have any recent developments in transportation in the local community--highways, vehicles, facilities--facilitated commuting by making it safer, more convenient, or more pleasant?

- Are there ways in which features of the environment affect, hinder, or facilitate commuting time, safety, and pleasure in terms of hampered visibility due to billboards or trees or unpleasant vistas due to junkyards or billboards?

ACTIVITY #16

Mini-unit Topic: Learning the Automobile's Effects

Approximate Class Time: ½-1 period

Capsule Activity Description: Students identify the beneficial effects highways and roads can have on the environment by evaluating a local highway or road.

Goal:

To be able to evaluate the relative beneficial and harmful effects highways and roads have on the environment.

Concepts Treated:

- Highways and roads can have beneficial effects on the environment.
- Citizens need to be able to assess the relative benefits and drawbacks to the environment of highways and roads.
- Citizens need to be able to assess the relative advantages and disadvantages of various features of the environment which hamper travel in terms of whether the environment or transportation should take precedence in any given instance of conflict between the two.

ACTIVITY

Break the class into small groups and assign each group to identify all the beneficial effects that highways and roads can have on the environment. Groups report their conclusions to the class and compile a master list of beneficial effects. Supplement this list by mentioning any of the following effects which the students fail to identify.

1. Highways may remove traffic from residential or business streets.
2. Highways may reduce those types of pollution emitted by stop-and-go traffic by providing means for traffic to move through the area at higher speed.
3. Well planned highways with express lanes for buses may decrease traffic congestion and lessen pollution by encouraging people to use public transportation.

4. Highways may provide space for parks and mini-parks through joint development programs, in which municipalities and highway agencies cooperate in creating small parks adjacent to the right-of-way.

5. Highways may provide visibility to businesses, which may develop prestige architecture and landscaping for their headquarters.

6. A highway or road may replace an ill-kept, unattractive, or unpoliced area in the community with an orderly facility.

7. Highways may be considered as groups of land parcels that provide open space and breathing room, letting the light into an otherwise densely built urban environment.

8. Highway and street development and the associated landscaping, mini-parks, and historic preservation areas may allow beneficial uses of the urban land.

9. Well designed and maintained highways and roads may be of sufficient sophistication in structural and esthetic design to be interesting features of the environment.

10. Highways often provide views of cityscapes, harbors, and skylines that are interesting, revealing, and attractive.

11. By providing remote views of prominent national landmarks (for example, mountain peaks), highways may help engender appreciation of the natural areas.

12. Highways can protect natural areas by serving and encouraging the use of other natural or recreational areas of less fragility.

13. Where desired, highways and roads can provide access to natural environment areas, for appreciation and recreation.

14. Rest areas along highways can provide attractive spots for viewing the local countryside.

If it has not already done so in Activity #13, the class then identifies the harmful effects highways can have on the environment.

The small groups reform and each group identifies a different road or highway in the community which has recently been built, is being planned, or is under construction. Each group analyzes the beneficial and harmful effects its highway or road has had or may have on the environment and discusses whether, on balance, the benefits outweigh the costs to the environment. Each group prepares an explanation of why it has determined that the environment or transportation should take precedence.

The groups report their conclusions to the class and compare findings. Check to see whether most of the groups decided that the environment or transportation should take precedence and what similar reasons the groups may have given to support their positions. You may need to point out that in weighing the advantages and disadvantages of highway and road construction,

not only must the environmental effects of these facilities be considered; additionally their other social benefits and costs must be considered, such as their contribution to transportation safety and convenience, and their effect on employment.

Evaluation Method:

Students plan a hypothetical highway for their own community which balances transportation and environmental needs.

Variations and Supplementary Activities:

Students can identify ways in which unavoidable harmful environmental effects of roads and highways can nevertheless be mitigated, as in the following ways.

a. Planning can locate highways and roads far enough from sensitive areas so that noise and air pollution are not problems.

b. Noise barriers can be erected to shield residential or other sensitive areas from vehicle noise on highways and roads.

c. Plantings and attractive land formation can be included in road and highway construction to beautify the right-of-way.

d. Tunnels, platforms, and depressed sections can hide highways and roads in areas of sensitive use or high visual character.

e. Joint development and the use of air and underground rights in the right-of-way can provide a means of visually and environmentally unifying neighborhood that would otherwise be severed by a highway or road.

f. Federal and often state relocation programs can provide a mandated service of assistance and payment for relocating homes, businesses, and public facilities displaced by highway construction.

Students can interview appropriate governmental authorities about the beneficial and harmful effects highways and roads can have on the environment.

MINI-UNIT 4

IDENTIFYING SOLUTIONS TO CONFLICTS BETWEEN TRANSPORTATION AND THE ENVIRONMENT

The nature of problem solving is always a key issue in social dilemmas, and conflicts between transportation and the environment are no exception. The need for more and better travel vehicles and facilities often conflicts with the critical importance of protecting the environment. In turn, desirable features of the environment often hinder travel, safety, comfort, and convenience.

This mini-unit helps students to identify typical conflict areas between transportation and the environment, methods for resolving them, and agencies and groups that can contribute to their resolution. The unit does not attempt to cover every possible conflict or resolution--an impossible task; rather, it focuses on a few examples of such conflicts and engages students in the *process* of conflict resolution so that, armed with this skill, they can later turn their attention to resolving the variety of conflicts which will confront them in the area of transportation and the environment.

This unit also treats the following key concepts:

- A major solution to conflicts between transportation and the environment lies in government action to resolve such problems.
- Citizens need to be aware of the government's attempts to balance the needs of transportation and the environment in order to evaluate them and encourage the government to alter or expand its efforts in this direction.
- Citizens need to be aware of solutions to situations in which they are personally inconvenienced or endangered by transportation's effects on the environment.
- There are many times when it is appropriate for the public to engage in citizen participation to oppose a harmful effect of transportation on the environment or to correct a hindrance to travel caused by the environment.
- Increased use of public transportation and carpools can help reduce the harmful effects of automobiles on the environment.
- Citizens need to be discriminating when selecting actions which they hope will solve conflicts between transportation and the environment.

MINI-UNIT 4 LESSON PLAN

Identifying solutions to conflicts between transportation and the environment

Activity #	*Activities*	*Class Time*
17	DESCRIPTION: Students discuss one or more solutions to conflicts between transportation and the environment. GOAL: To be able to resolve conflicts between transportation and the environment.	½-1 period
18[a]	DESCRIPTION: Students discuss and evaluate actions the government is taking to reduce transportation's harmful effects on the environment.[a] GOAL: To know how the government is attempting to balance the needs of transportation and the environment.	½-1 period
19[a] Spirit Masters #1,#2,#3,#4	DESCRIPTION: Students play a game in which they select and defend solutions to problem situations in which they are personally affected by transportation or the environment.[a] GOAL: To be able to resolve conflicts between transportation and the environment.	1-2 periods
20[b] Spirit Master #5	DESCRIPTION: Students discuss when to engage in citizen participation to oppose a harmful transportation effect on the environment or feature of the environment which interferes with travel.[b] GOAL: To be able to decide when citizens should engage in citizen participation to oppose a harmful transportation effect on the environment.	1 period

[a]This activity also appears in Mini-unit 1.

[b]This activity also appears in Mini-unit 6.

MINI-UNIT 4 LESSON PLAN (CONTD.)

Identifying solutions to conflicts between transportation and the environment

Activity #	*Activities*	*Class Time*
21 Spirit Master #7	DESCRIPTION: Students discuss how increased use of public transportation and carpools might help solve conflicts between transportation and the environment. GOAL: To realize that public transportation and carpooling offer ways to solve conflicts between transportation and the environment.	1½-2 periods
		Total Class Time: 4½-7 periods

Total Class Time: 4½-7 periods.

ACTIVITY #17

Mini-unit Topic: Resolving Conflicts

Approximate Class Time: ½-1 period

Capsule Activity Description: Students discuss one or more solutions to conflicts between transportation and the environment.

Goal:

To be able to resolve conflicts between transportation and the environment.

Concepts Treated:

- Conflicts between transportation and the environment can often be resolved.
- Citizens need to develop the ability to resolve conflicts between transportation and the environment.

ACTIVITY

Have the class debate informally one or more of these issues.

- Resolved that the central business district should be off-limits to automobiles all day Sunday and from 10 A.M. to 3 P.M. weekdays.
- Resolved that employees who ride to work in carpools should receive a tax rebate of 10 percent; should be provided with special high speed lane(s) for faster rush-hour commuting; etc.
- Resolved that 50 percent of all tax money from sales of gasoline and automobiles should be used to finance mass transit.
- Resolved that gasoline should be taxed 100 percent; rationed; or taxed and rationed.
- Resolved that all airports should be closed to air carrier traffic between 11 P.M. and 6 A.M.
- Resolved that the government should provide free public transportation to encourage citizens not to use their cars.

- Resolved that highway construction in the city reduces stop-and-go traffic and thereby reduces pollution.

- Resolved that local community groups should not be allowed to veto new transportation facilities (highways, airport expansion, etc.) when the latter benefit the entire community.

- Resolved that the state should ban billboards totally or from all limited access highways.

- Resolved that the speed limit for cars should be set uniformly.

- Resolved that an excise tax should be placed on the sales process of large cars or that large cars should be banned.

- Resolved that special lanes should be provided for buses or cars with three or more occupants.

- Resolved that owners of automobile junkyards should screen their operations from public view.

- Resolved that billboard advertising along public highways should not be restricted.

To ensure that as many as possible of these topics are carefully considered by the students, you can have students write a theme on one or more of the debate topics, taking a position and defending it. You can divide the class into small groups, have each group select a different topic to debate, and require each group to attempt to reach a consensus regarding the issues involved and present its opinions to the class.

Evaluation Method:

- Students select one of the debate topics not used during the activity and discuss it until the class agrees on a resolution.

Variations and Supplementary Activities:

Students can research and debate the provisions and effectiveness of environmental laws as they apply to transportation vehicles and facilities. Among the laws they can research and discuss are

- The Clean Air Amendments of 1970*

- The Highway Beautification Act of 1965*

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*Explained in Chapter III of this manual, "Readings on Transportation and the Environment."

- The Noise Control Act of 1972*
- The Federal Water Pollution Control Act Amendments of 1972
- The National Environmental Policy Act of 1969
- The Freedom of Information Act
- The Federal-aid Highway Act of 1970 (Section 136b)*
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970

Students can discuss who should be responsible for educating the public about transportation's effects on the environment in terms of which groups or agencies would be most effective and fair in educating and motivating the public and why; which of these groups have an obligation to educate the public; and what kinds of educational campaigns they should mount. If you selected television, what kinds of programs should be shown, who should develop and pay for them, and how long should they run?

Students can discuss several dilemmas between protecting the environment and developing additional energy resources. Sample dilemmas are provided below. Some involve events which have already occurred but which can be discussed in terms of whether they should not have occurred.

1. Should the National Environmental Policy Act be suspended to allow construction of the Alaska pipeline?

   Dilemma: Proponents of the Alaska pipeline say its construction will allow millions of barrels of oil from Alaska to flow to other states; without it, there is no economically feasible way to transport the oil to the rest of the country. Opponents of the pipeline say there is a real danger of a pipe leak which could pollute millions of acres of land beyond repair, and the technology needed to extract the oil will damage the land in Alaska.

2. Should regulations controlling strip mining be delayed?

   Dilemma: Proponents of strip mining claim that extensive land stripping is the only economically feasible way to locate certain coal deposits. Opponents of strip mining want to outlaw or regulate it because it destroys so much land and can cause landslides.

3. Should off-shore oil drilling and prospecting be allowed?

   Dilemma: Proponents of drilling for oil deposits in the ocean near the coastlines argue that there are unknown deposits of badly needed oil

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*Explained in Chapter III of this Manual, "Readings on Transportation and the Environment."

there and that we cannot afford to leave this source untapped. Opponents argue that off-shore drilling runs the risk of polluting the water and coastline with oil leaks and destroying marine life and beaches.

4. Should enforcement of the Clean Air Act of 1970 which requires reduced exhaust emissions from all motor vehicles be delayed?

   Dilemma: Proponents of delaying or eliminating provisions of the Clean Air Act that requires motor vehicles to limit their carbon monoxide, hydrocarbon, and other emissions through the installation of pollution control devices claim that such devices reduce the number of miles a car can travel on a gallon of gas. A car must therefore use more gasoline per mile traveled. Opponents of nullifying the Clean Air Act argue that without them auto emissions will continue to pollute the air, causing serious health problems.

   Dilemma: Proponents of reducing or eliminating provisions of the Clean Act that require the removal of lead from gasoline feel that this reduces the amount of gasoline available for automobiles. Opponents of leaded gasoline argue that lead emissions from cars endanger health.

ACTIVITY #18*

Mini-unit Topic: Resolving Conflicts

Approximate Class Time: ½-1 period

Capsule Activity Description: Students discuss and evaluate actions the government is taking to reduce transportation's harmful effects on the environment.*

Goal:

To know how the government is attempting to balance the needs of transportation and the environment.

Concepts Treated:

- A major solution to conflicts between transportation and the environment lies in government action to resolve such problems.
- The government is already attempting to balance the needs of transportation and the environment.
- Citizens need to be aware of the government's attempts to balance the needs of transportation and the environment in order to evaluate them and encourage the government to alter or expand its efforts in this direction.

ACTIVITY

1. Present examples of actions the Federal government is taking to reduce transportation's harmful effects on the environment, such as encouraging less reliance on automobiles through carpooling and emphasis on mass transit.

Federal assistance for mass transportation began in 1961 with an emergency loan program and a small test and demonstration program. In 1964 the Urban Mass Transportation

*This activity also appears in Mini-unit 1.

Act established a program of Federal matching grants for preservation, improvement and expansion of public transportation systems. Amendments to this Act have provided broader program goals, higher funding levels, longer periods of assured Federal assistance and greater flexibility in meeting local needs. Funding increased from 50.7 million dollars in 1965 to 133 million dollars in 1970 to over 1.4 billion dollars in 1976 for the purchase and construction of mass transportation facilities.

The Federal-aid Highway Act of 1973 granted flexibility in the use of highway funds for public transportation purposes by opening Urban Systems funds (previously targeted solely for highways) to transit, both rail and bus; and by opening all highway funds to exclusive lanes for buses, traffic control devices, bus shelters, parking facilities, etc. In addition interstate highway funds also were made available for nonhighway public transportation purposes under certain conditions.

Significant steps toward rehabilitating the nation's rail system are now being taken as the result of new legislation providing 6.4 billion dollars in Federal aid to railroads. Key features in the law are the following provisions:

- Seven bankrupt Northeast and Midwest railroads are reorganized into the Consolidated Rail Corporation (ConRail), a freight railroad in which the Federal government is authorized to invest. The law provides 2.1 billion dollars for the start-up of ConRail.

- The Department of Transportation will upgrade rail passenger service in the Northeast Corridor. The five-year program will cost 1.75 billion dollars and will include improvements in tracks, stations, bridges. tunnels, signalling, and traffic control. In addition, there will be an expanded program of converting from diesel engines to electric engines; this will reduce pollution and save energy. A program is established for financing railroad rehabilitation and improvement. A fund of 1.6 billion dollars is provided, to be administered by the Secretary of Transportation.

- A two-year program of subsidies is provided for bankrupt freight and commuter branch lines in the Northeast and Midwest. Without this subsidy program, these bankrupt lines could be discontinued because the new legislation has not made them part of ConRail. This provision offers 100 percent Federal financing for the first year of the subsidy and 90 percent for the second year.

- Another Federal program of assistance to branch lines is also established by the law, for a five-year period. This funding will be available to all states for the purchase or acquisition of bankrupt lines. This

provision offers financing ranging from 100 percent for the first year to 70 percent for the fourth and fifth years.*

2. Other actions of the Federal government include enacting noise control legislation to reduce excess noise from snowmobiles, trucks, and airplanes and supporting and funding of highway beautification projects.**

Then give specific examples of programs the government is undertaking or has completed that are designed to achieve these objectives:

Grants to cities, towns, and counties for the purchase of public transportation vehicles, such as buses--for example, a grant of 474,852 dollars to the County of Hawaii to assist in the purchase of ten new passenger buses, bus signs, and related equipment.

Grants and contracts to organizations to research the feasibility of a variety of energy-saving and environment-protecting modes of travel--for example, an award of 150,000 dollars to the Massachusetts Institute of Technology to provide research on control procedures for Dial-A-Ride, a bus system in which people phone the bus system requesting the bus stop at their home.

Surveys to learn how transportation facilities and vehicles can reduce negative effects on the environment--for example, a survey to determine the potential for increasing transportation energy conservation by strengthening international cooperative research programs. This is an attempt to learn from nations that long ago adjusted to the problem of a limited energy supply ideas that may be applicable in the United States. Interviews have been conducted with officials in France, West Germany, Sweden, Switzerland, and England.

Conferences in which national experts or officials are gathered together to discuss solutions for some of transportation's harmful effects on the environment--for example, a national conference that was held on the railroads' role in meeting the nation's energy requirements. The two-day meeting brought together members of both public and private interest groups as well as the academic community.

Guidelines and requirements for industry prescribing certain behaviors that will reduce transportation's effects on the environment--for example, the Federal Aviation Administration has recommended new ground operating procedures for jets at airports to reduce engine emissions and conserve fuel. It recommended that four-engine jets shut down one or two engines while taxiing to the terminal after landing or during protracted holds before takeoff. Three-engine jets would shut down one engine.

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*A fact sheet presenting full details on all provisions of the Railroad Revitalization and Regulatory Reform Act of 1976 is available from Office of Public Affairs, Federal Railroad Administration, Washington, D.C. 20590.

**See Chapter III in this manual, "Readings on Transportation and the Environment."

Passage of legislation limiting some of transportation's harmful effects on the environment--for example, a law requiring the installation of emission control devices on automobile exhausts and another reducing the speed limit to 55 mph. (Some of the other laws the government has passed that are designed to reduce transportation's harmful effects on the environment are discussed in Activity #63 and in the Readings.) In another example, the Refuse Act of 1899 prohibits the throwing, discharging, or depositing of any refuse matter into the waters of the United States to a distance of three miles from the coastline. The Federal Water Pollution Control Act prohibits the discharge of oil or hazardous substances into the waters of the United States to twelve miles off shore. And boaters are required by law to notify the U.S. Coast Guard if their vessel or facility discharges oil or hazardous substances into the water.

Demonstration projects which the government funds to learn about the feasibility of methods for reducing transportation's harmful effects on the environment--for example, a 600,000 dollar carpool demonstration project in Los Angeles in which a computer program will provide computer-printed match lists to interested persons within a five-county area who fill out an application form. The project's goal is to remove 888,000 vehicles traveling the highways each day, save 170 millions of gallons of gasoline a year, and reduce by 71,000 tons the amount of pollutants put into the air in the area each year.

Efforts to reduce the effects of and the amount of noise pollution, for example:

- Passage of the Occupational and Safety Health Act which establishes a framework for regulating any and all workplace hazards including excessive noise exposure. Under this act, the Department of Labor and the Department of Transportation have both established regulations for drivers of commercial vehicles in terms of hours of service and noise levels generated by the vehicles at the operator station. For example, certain regulations pertain to the use of hearing protection devices for ground crews around military and commercial aircraft.

- Public Law 90-411 authorizes the Federal Aviation Administration to establish noise standards for aircraft. Such standards have been issued for a variety of new aircraft, resulting in quieter wide body aircraft such as the 747, DC-10 and L-1011 plus the development of quieting kits for existing aircraft such as the 727, 737, DC-9, DC-8 and 707. Regulations are also being established (1974) to regulate ways in which all aircraft are to operate in the vicinity of airports to reduce noise exposure to adjacent communities.

- The Federal Highway Administration has established noise standards for the design and citing of all new interstate highways and for the design and approval of projects to reduce the noise from existing highways.

- The Department of Transportation is directing research and development activities to demonstrate quiet trucks and quiet tires for all vehicles on the highways in order to reduce transportation noises.

3. Finally, discuss with students the following issues:

Does it seem that the Federal government's actions are effective? How can you tell?

Are there other actions the Federal government should be taking but isn't? If so, what are these actions? Why might the government not take these actions? What constraints may make it difficult for the government to take further action or to enforce the legislation it has enacted?

How can citizens help the Federal government to take effective actions to reduce transportation's harmful effects on the environment--for example, by attending hearings, by sending their opinions to the government agencies and by getting involved in regional transportation planning efforts?

Evaluation Method:

Students describe the actions the government is taking to resolve conflicts between transportation and the environment by role-playing dialogues between "newspaper reporters" and "government public information officers" (government officials responsible for communicating government policies to the press and the public).

ACTIVITY #19*

Mini-unit Topic: Resolving Conflicts

Approximate Class Time: 1-2 periods

Capsule Activity Description: Students play a game in which they select and defend solutions to problem situations in which they are personally affected by transportation or the environment.*

Goal:

To be able to resolve conflicts between transportation and the environment.

Concepts Treated:

- Transportation often affects people in personally disagreeable ways.
- The environment sometimes affects people's ability to travel safely, conveniently, or enjoyably.
- Citizens need to be aware of solutions to situations in which they are personally inconvenienced or endangered by transportation effects on the environment.
- Citizens need to be discriminating when selecting actions which they hope will solve conflicts between transportation and the environment.

ACTIVITY

Students in small groups (or as a class) respond in this game to hypothetical situations in which they are personally bothered by a transportation effect on the environment or by a feature of the environment which interferes with their ability to travel safely, conveniently, or enjoyably. Students select and defend solutions to the conflicts and are scored by other players on their choices and on their ability to defend their solutions.

You will need to duplicate class sets of the *Solution Cards*, *Problem Situation Cards*, and *Score Sheets* so that each player receives a complete set (page) of eight *Solution Cards* and a *Score Sheet*. Each group of players

*This activity also appears in Mini-unit 1.

also receives two *Problem Situation Sheets* (two sets of eight *Problem Cards*). All these playing materials are provided on Spirit Masters #1, #2, and #3.

The game is played by groups of three or four students. Playing instructions are provided on Spirit Master #4. You will want to review them with the class before the game is played.

Evaluation Method:

Game is self-evaluating.

Variations and Supplementary Activities:

The length of time for each step may be altered to suit different age and ability levels and different time constraints.

Students can develop their own problem situation and solution cards for subsequent game plays.

For each problem situation, students can discuss who *benefits* from the state of affairs and how they are benefited.

ACTIVITY #20*

Mini-unit Topic: Resolving Conflicts

Approximate Class Time: 1 period

Capsule Activity Description: Students discuss when to engage in citizen participation to oppose a harmful transportation effect on the environment or a feature of the environment which interferes with travel.*

Goal:

To be able to decide when citizens should engage in citizen participation to oppose a harmful transportation effect on the environment.

Concepts Treated:

- There are many times when it is appropriate for the public to engage in citizen participation to oppose a harmful effect of transportation on the environment or to correct a hindrance to travel caused by the environment.
- Citizens need to be able to identify when citizen participation is justified to oppose a transportation vehicle or facility which has or will have harmful effects on the environment.
- Citizens need to develop the ability to resolve conflicts between transportation and the environment.

ACTIVITY

Give students one of the scenarios provided on Spirit Master #5 or a scenario you or the students themselves develop for the activity. Have students write whether they feel the citizen affected in the scenario by the harmful transportation effect or feature of the environment has the right to engage in citizen participation to oppose or alter it and why.

During the following class period, break the students into small groups and give them written instructions to read the papers of the other members of their groups and try to reach a consensus on:

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*This activity also appears in Mini-unit 6.

1. Whether the citizen described in the scenario is justified in taking action against the harmful transportation effect or feature of the environment;

2. Why the citizen should or should not take action; and

3. What the nature of the transportation effect or feature of the environment would have to be--how serious, how many people affected--before citizen participation would be justified.

Then have the groups describe their conclusions to the class, allowing other groups to comment on the presenting group's idea.

Finally, conduct a class discussion around whether or when the following considerations would warrant citizen participation against the use of a vehicle or transportation facility which is having harmful effects on the environment or against a feature of the environment which interferes with travel safety, comfort, or enjoyment.

- How many people must be affected vs. how many are benefited?
- How much are the people harmed vs. how much are other people benefited?
- Did the affected people move into the area after the problem existed?
- Are there personal, inexpensive preventive measures citizens can take to reduce or eliminate the problem?
- Are there important transportation needs the mode of travel or facility meets that outweigh its harmful effects?
- Are there constraints--time, financial, or technological--that make it difficult or impossible to solve the problem?

Evaluation Method:

Students decide whether citizens should engage in citizen participation for one of the scenarios on Spirit Master #5 which was not used during the activity.

ACTIVITY #21

Mini-unit Topic: Resolving Conflicts

Approximate Class Time: 1½-2 periods

Capsule Activity Description: Students discuss how increased use of public transportation and carpools might help solve conflicts between transportation and the environment.

Goal:

To realize that public transportation and carpooling offer ways to solve conflicts between transportation and the environment.

Concepts Treated:

- The harmful and beneficial effects of different modes of transportation on the environment should be identified and weighed in determining how to travel.
- Increased use of public transportation and carpools can help reduce the harmful effects of automobiles on the environment.

ACTIVITY

Public transportation and carpooling offer tremendous potential for reducing the public's reliance on automobiles or single-occupant automobiles for travel to work and for other travel purposes. However, public transportation and carpooling also have drawbacks. This activity involves students in examining both the advantages and disadvantages of these two alternate modes of travel.

Duplicate copies of the check sheet provided on Spirit Master #7 and distribute two copies to each student. Each student fills in one, placing check marks in the boxes to indicate good features they feel different modes of public transportation and carpooling offer in general, without special reference to their community. For example, taxis offer a fair amount of privacy; subways use energy relatively efficiently. Students then think specifically of their own community and place check marks in the boxes of the second copy of the chart to indicate good and bad features they feel different modes of public transportation and carpooling offer in their community.

The class then breaks into small groups. Each group compares its members' sheets and discusses discrepancies among them until it is able to develop (using two more blank sheets) a consensus on the positive and negative features of public transportation and carpooling in general and in their community.

Each group presents its results to the class and the opinions of all the groups are compared. Disagreements among groups are discussed and explained. Follow-up discussion is held to consider which of the seven (or more, if students added to the list) general features of public transportation and carpooling are most important and why, that is, which of these features would be most likely to motivate a citizen to use public transportation or carpools instead of a single-occupant car or use one particular mode of public transportation instead of another. The features can be listed in order of importance.

Conclude the activity by asking students to discuss the extent to which increased use of public transportation or carpools might help to resolve some of the conflicts between automobile use and the environment and whether citizens should consider these socially beneficial outcomes in deciding how to travel.

Evaluation Method:

Students describe how increased use of public transportation and carpooling might reduce the harmful effects of automobiles on the environment.

Variations and Supplementary Activities:

This activity can be simplified or made more complex in a number of ways. For example, students can fill in one chart as a class, considering only their own community's public transportation facilities. Students can also refine the sub-listings under each of the seven features to include time of day travel occurs, type of person doing the traveling (e.g., handicapped? child?), weather conditions, or comparisons with walking or bicycling as the alternative modes of travel. For example, taking a ferry may be relatively more expensive for the poor than for the middle class. Using a taxi may be less convenient for minority persons who are often refused rides than for whites who are routinely picked up. Taxis may be more comfortable to use in cold, heat, rain or snow than buses for which one may have to wait outdoors. On the other hand, taxis are expensive.

The students can adapt the chart into a questionnaire and poll the community to learn its attitudes toward the advantages and disadvantages of using public transportation and carpools.

They can insert private modes of transportation at the top of the chart and draw comparisons between them and different forms of public transportation and carpooling.

The students can pick a community about which they have some information (e.g., New York City, the nearest big city, the nearest rural area) and which is different from their own community in terms of size and types of public transportation available and complete the chart for that community. They can compare and contract the results.

MINI-UNIT 5

TAKING PERSONAL ACTIONS TO RESOLVE CONFLICTS BETWEEN TRANSPORTATION AND THE ENVIRONMENT

Mini-units 2 and 3 dealt with the effects of transportation on the environment and Mini-unit 4 involved identifying solutions to conflicts caused by these effects. This mini-unit deals with actions citizens can take to help resolve these conflicts.

The unit focuses specifically on actions individuals can take both in their own personal behavior and in their relationships with other people--their friends, relatives, and neighbors.

In the long run, knowing how the needs of transportation and the environment can conflict and being able to identify solutions for such conflicts are useless pieces of information unless they are put into action by citizens in their daily lives. This unit therefore focuses not only on what actions citizens can take in their personal lives and in groups; it also seeks to motivate them to take appropriate action.

Key concepts treated in the unit include

- There are several positive actions the public can take to help reduce pollution and the depletion of scarce energy resources from excessive use of automobiles.
- Many people have strong motivation for not changing their travel habits in ways which would help the environment.
- Identifying these motives in ourselves and others is the first step in eventually altering our own and other people's travel behavior.
- Citizens need to evaluate the use of automobiles to satisfy emotional needs in light of the harmful effects on the environment caused by excessive automobile use.
- Citizens need to decide for themselves when it is appropriate to urge other people to change travel practices which harm the environment.
- There are effective methods by which citizens can attempt to persuade others to travel in ways which protect the environment and conserve scarce energy resources.

MINI-UNIT 5 LESSON PLAN

Taking personal actions to resolve conflicts between transportation and the environment

Activity #	*Activities*	*Class Time*
22[a]	DESCRIPTION: Students discuss what actions private citizens can take in their personal travel behavior to reduce the harmful effects of automobile use on the environment.[a] GOAL: To know what actions individuals can take in their personal travel behavior to reduce the adverse effects of automobiles on the environment.	½-1 period
23[a]	DESCRIPTION: Students discuss America's alleged "love affair" with the automobile and how this may have affected patronage of public transportation.[a] GOAL: To be aware of the many reasons people drive cars and of which reasons are appropriate.	½-1 period
24 Spirit Master #8	DESCRIPTION: Students examine their own attitudes toward changing their travel habits to reduce transportation's harmful effects on the environment. GOAL: To be aware of why people may be reluctant to change their travel habits.	½-1 period
25	DESCRIPTION: Students discuss when it is appropriate to object to someone's use of transportation which is having detrimental effects on the environment. GOAL: To be able to decide when it is appropriate for private citizens to object to the environmental consequences of another citizen's transportation practices.	½-1 period

[a]This activity also appears in Mini-unit 1.

MINI-UNIT 5 LESSON PLAN (CONTD.)

Taking personal actions to resolve conflicts between transportation and the environment

Activity #	*Activities*	*Class Time*
26	DESCRIPTION: Students role play scenarios in which one person complains to another that his or her travel behavior is having harmful environmental effects. GOAL: To be familiar with several methods to persuade or encourage other people to travel in ways which protect the environment.	1 period

Total Class Time:
3½-5 periods.

ACTIVITY #22 *

Mini-unit Topic: Taking Personal Actions

Approximate Class Time: ½-1 period

Capsule Activity Description: Students discuss what actions private citizens can take in their personal travel behavior to reduce the harmful effects of automobile use on the environment.*

Goal:

To know what actions individuals can take in their personal travel behavior to reduce the adverse effects of automobiles on the environment.

Concepts Treated:

- There are several positive actions the public can take which will help reduce pollution and depletion of scarce energy resources resulting from excessive use of automobiles.
- Citizens need to pinpoint actions they can take to reduce automobile pollution that will benefit the environment the most.

ACTIVITY

Students write their response to the scenario below:

The Mayor has just appointed you Commissioner of Transportation and the Environment for your community. He has asked you to come up with a plan of action that lists the *actions individual citizens can take to (1) reduce the effects of auto emissions on the environment and (2) reduce the extent to which cars use up energy resources.* You have ten minutes right now in which to write a list of recommendations.

Then break the class into small groups, instructing the members of each group to read each other's lists and discuss:

1. Which actions you agree most citizens will voluntarily undertake and *why* you believe citizens would do so

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*This activity also appears in Mini-unit 1.

2. Which actions citizens could be motivated to undertake, and *how* they could be motivated to do so

3. Why some citizens will not take some promising actions

Groups report conclusions to the class and respond to questions and comments from you and the other groups. Raise for discussion any actions that students may have ignored:

1. Use public transportation whenever possible.

2. Use carpools and bicycles--and walk.

3. Maintain a car in optimum emission-reducing condition.

4. Use good driving habits, avoiding unnecessary emission-producing maneuvers (see suggested list at the end of the activity).

5. Buy unleaded gasoline.

6. Buy cars with the lowest levels of emissions.

Evaluation Method:

Students describe the actions the public can take in their personal travel behavior which will help reduce the harmful effects of automobiles on the environment and indicate why these actions would be effective.

GETTING THE BEST MILEAGE FROM YOUR GASOLINE

After you have selected the gasoline with the octane rating and the additives you need, as described in this publication, you can take several precautions to improve performance and save gasoline.

First, to improve performance:

- Shop for a good mechanic. Check your friends and neighbors to see if they know one who is a specialist on your car.

- If you have your car serviced at a large agency, get acquainted with the service manager and see if you can have the same mechanic service your car every time.

- Be sure that a careful service record is kept on all repairs, so that the mechanic knows what work has been done before, and when.

- Follow the recommendations in your Owner's Manual for major and minor service and tune-ups.

Second, to save gasoline and conserve energy:

- Check your tire pressure at least once every month. Too low tire pressure increases rolling resistance, causes increased tirewear and reduces gasoline mileage.
- Periodically have your mechanic check the treadwear pattern of your tires to see if they are properly aligned. If they are out of alignment, the tires will wear excessively and your gasoline mileage will drop.
- If possible, avoid pressing your accelerator all the way down when climbing hills and long grades. It wastes gasoline.
- Avoid excessive high speed or jerky driving; learn to drive as smoothly and steadily as traffic and road conditions allow.
- Turn off your engine if you stop more than a minute. Restarting uses less gasoline than a minute's idling.
- Use the brake rather than the accelerator to hold you car in place on a hill.
- Jumpy starts and fast getaways can burn over 50 percent more gasoline than normal acceleration.
- Avoid weaving, spurting and lane changing in heavy traffic. Such practices waste fuel.
- Look ahead and pace yourself to minimize stops at traffic lights and jam-ups.
- Slow down. Excessive speed is the greatest waster of gasoline. For best mileage do not exceed 50 miles per hour.
- Limit the use of auto air conditioners and other fuel consuming accessories.
- If you get a sudden drop in gasoline mileage, check with your mechanic. Trouble is brewing, and the sooner you have it fixed the less it is likely to cost you.
- Before you buy a new car, ask the dealer how many miles per gallon you can expect. These figures are now available for most models.
- Reduce the number of unessential auto trips through careful trip planning.
- Use mass transit, carpools or bicycles when feasible.

ACTIVITY #23*

Mini-unit Topic: Taking Personal Actions

Approximate Class Time: ½-1 period

Capsule Activity Description: Students discuss America's alleged "love affair" with the automobile and how this may have affected patronage of public transportation.*

Goal:

To be aware of the many reasons people drive cars and of which reasons are appropriate.

Concepts Treated:

- Many people have emotional as well as practical reasons for driving cars.
- The harmful and beneficial effects of different transportation modes on the environment should be identified and considered in deciding how to travel.
- Citizens need to evaluate the appropriateness of using automobiles to satisfy emotional needs in light of the harmful effects on the environment excessive automobile use causes.

ACTIVITY

Students write their response to the following instructions and scenario:

> It was the biggest event in my life. I had been looking forward to it for at least four years, and the last year was an agony of waiting for my dream to come true: a car! At last I'd be able to do all the things I'd been waiting for.

Write down the reasons you think this young man was so eager to drive.

During the following class session, students break into small groups and are given written instructions to read each other's papers and discuss one or more of the following issues:

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*This activity also appears in Mini-unit 1.

1. What responses you gave for why the youth was so happy to be able to drive

2. What other reasons people have for driving cars

3. Which of these reasons involve the use of cars as a necessity, a luxury, or an important means of transportation that *public transportation could not provide nearly as well*

4. Explanations for why people prefer cars to public transportation and whether it is desirable and possible to change Americans' attitudes about cars, and if so, how

5. What arguments there are for using public transportation in certain circumstances rather than automobiles

6. How these arguments could be presented to the motoring public effectively and who should be responsible for educating the public to the importance of reducing its reliance on automobiles (for making more efficient use of the automobile) and increasing its use of public transportation

Groups report their conclusions to the class and respond to comments and questions from the class and you. Raise for discussion additional reasons some people have for preferring to travel by car rather than by public transportation.

- Privacy
- Convenience: door-to-door service
- Comfort: regulated heating, uncrowded, seats available
- Apparent cost-effectiveness: no money is paid during most trips
- Speed: often less time-consuming than other travel modes
- Appearance: driver can "show off" his car
- Flexibility: can stop and get out or take side trips at will

Evaluation Method:

Students role play dialogues between advocates of automobile travel and proponents of increased travel by public transportation.

Variations and Supplementary Activities:

- Students can poll friends and neighbors on reasons they wanted a driver's license when they became of age.

- Students can discuss whether a reduction in the use of automobiles would have adverse effects on the economy and on employment.

- Students can research and discuss the role automobile manufacturers and the highway lobby (a congressional pressure group representing the trucking, automobile, highway construction, and other industries with interests in highway construction, maintenance, and improvement) may have played in encouraging America's alleged preoccupation with and preference for the automobile--for example, by analyzing automobile advertisements.

- A representative of an automobile club or highway agency can be invited to class to respond to and expand on the students' conclusions.

ACTIVITY #24

Mini-unit Topic: Taking Personal Actions

Approximate Class Time: ½-1 period

Capsule Activity Description: Students examine their own attitudes toward changing their travel habits in ways which will reduce transportation's harmful effects on the environment.

Goal:

To be aware of why people may be reluctant to change their travel habits.

Concepts Treated:

- Many people have powerful motives for not changing their travel habits to ways which would help the environment.
- Identifying these motives in ourselves and others is the first step in eventually altering our own and other people's travel behavior.

ACTIVITY

Tell the students that honesty about their feelings during this activity is essential to its success. Then have the students write responses to the instructions and scenario provided on Spirit Master #8. Next, break the class into small groups and give them written instructions to read each other's responses and discuss:

1. The reasons students who refused to take the action did so, and why those who agreed to take the action might, nevertheless, have been reluctant to do so. Members should feel free to probe each other's motives to ensure that the real reasons for abiding or refusing to abide are discussed.

2. Each reason for refusal or reluctance to take action in terms of how it could be overcome. Students might, for example, think of ways to overcome selfishness by showing evidence that in the long run taking the action will be in their own best self-interest.

The groups report results to the class and respond to comments and questions. Raise for discussion reasons for inaction not mentioned by students, such as habit, laziness, selfishness, fatalism, ignorance (about

what I can do or what the effects of my actions would be), lack of time, or suspicion the President is exaggerating the seriousness of the problem.

You can also introduce methods not mentioned by students for encouraging oneself (and others) to overcome these reasons for inaction, such as: one's self-interest is served in the long run, if not in the short run; individual actions can help solve the problem, not only as a result of one's own actions, but by inspiring others by one's example to take similar action.

Evaluation Method

Students describe the reasons most people have for using the travel modes they do instead of public transportation.

Variations and Supplementary Activities:

- If discussing their own attitudes is threatening, students can discuss reasons other people may refuse to take personal actions.
- Each student can describe in writing a desirable action citizens should take to reduce transportation's harmful effects on the environment. Students can exchange papers, and each student should explain to the author why he thinks people might be reluctant to engage in the activity and how their reluctance could be overcome.
- You can compare the students' attitudes toward public transportation which they expressed during the activity with those of other teenagers portrayed in the reading provided at the end of the activity.

TEENAGERS AND AUTOMOBILES

The following are selections from a report* published by the U.S. Department of Transportation, Federal Highway Administration. The study sought to determine how teenagers (called "panelists" in the report) travel and whether they would be likely to use public transportation if they were provided with the proper incentives to do so.

> Panelists' preferences for [transportation] modes were examined by looking at mode usage both collectively and among panelists [i.e., students] with differing mode access. Either way, our teenagers were not dependent on public transit; the basic mode choices involved walking and automobiles. Transit accounted for eight percent of all trips, 11 percent of the trips by unlicensed young

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**Travel Patterns and Problems of Suburban High School Males*, by Douglas B. Gurin (U.S. Department of Transportation: 1974).

panelists, and 18 percent of the trips by unlicensed older panelists. Walking accounted for 40 percent of all trips, and 63 percent of trips by younger unlicensed panelists; even licensed youth made more than one-fourth of their trips on foot. Panelists used automobile travel on 51 percent of their trips as drivers, passengers, or hitchhikers. Automobiles provided unlicensed young panelists with twice as many vehicle rides as transit. Overall trip levels remained about the same for older and younger unlicensed teenagers, but both transit and automobile trip shares increased with age. Since transit was equally available to young and old panelists, its increased use by older non-drivers suggests increased vehicle travel demand caused by maturational changes in behavior preferences. (The easing of parental travel restrictions, less fear of strangers, and the availability of more spending money also enabled older teenagers to increase their use of transit.) With licensing, driving substituted for both walk and transit tripmaking . . . .

Panel conversations and other data provided other insights about mode choice patterns that differ from commonly-held conceptions of teenager travel. Transit, motorcycles, hitchhiking, and bicycles were used by only a small fraction of our teenagers, whereas walking and automobiles were used daily by almost everyone. Transit usage was not high even among youth living within a three-minute walk of a transit stop (although the non-home orientation of many teenager trips may invalidate access distance as a measure of teenager transit availability). Diversion rates away from transit were not equal among all older youth; they seemed greater for adolescent "action-seekers" than for well-behaved, adult-like teenagers. Perhaps the most surprising fact about our panelists' mode availability and choice was the high reliance placed on car rides provided by friends rather than parents. Young panelists made only 27 percent of their car passenger trips as passengers with family adults. Family chauffeuring increased slightly with age among unlicensed panelists, as needs for venicular travel increased, but even among this group, friends provided more than twice as many car passenger rides as parents did. Overall, chauffeured travel accounted for just 13 percent of panelists' automobile trips and 6.5 percent of their total travel.

Several remaining key pieces of evidence lend support to our panelists' non-dependence on public transit for mobility. Trip generation rates, the percentages of weekly budgets spent on transportation, and the popularity of automobiles and walking, were all very similar among panelists from the three study communities, in spite of the varying availability of transit service.

Trip generation was reported to be highest in the evenings, on weekends, and during summers, when transit service was least available. Transit trip purposes were primarily for the most routine and familiar trip purposes of going to school and going home, whereas walking and car travel were used for all trip purposes. Panelists traveled with other people for 60 percent of their trips, in groups which averaged 2.4 people and often involved three or more friends; transit, unlike walking or cars, has many features such as individual fares and crowds which discourage peer group trips. Furthermore, fears of unwanted interactions with strangers inhibited panelists' use of transit for individual tripmaking; when panelists traveled alone, they used transit for seven percent of their trips, walking for 51 percent and car driving for 38 percent.

. . . [W]e conclude that improved teenager access to transportation may not increase their total trip levels or distances significantly. Likewise, it may not change most of their trip purposes or mode choices. The travel patterns of the mobile TMS teenagers probably represent the upper bounds on the magnitudes or proportions of trips that will be generated by improved access to transportation supply. Older teenagers who have poor transportation access already make "essential" trips to school and to home. They may just have less interest in self-initiated travel than older teenagers who take steps to obtain good transportation.

Some form of personal transportation seemed important to maturing working class, male panelists in particular. They felt compelled to secure their own transportation, even at high cost, because their parents and communities have appeared reluctant or unwilling (legally and morally) to provide family or public transportation for their adolescent trip purposes such as dating. Working class panelists reported negative outlooks on future marriage and full-time work, and felt pressure to have travel adventures and the excitement of vehicle ownership and control while they were still single. Their ideal system would also provide what families, schools, public transportation and other societal institutions could not or would not provide: feelings of freedom, adulthood, equality, masculinity, physical or emotional security, and, in some cases, status; a means of non-verbal self-expression; and an ability to help other people.

ACTIVITY #25

Mini-unit Topic: Taking Personal Actions

Approximate Class Time: ½-1 period

Capsule Activity Description: Students discuss when it is appropriate to object to someone's use of transportation that is having detrimental effects on the environment.

Goal:

To be able to decide when it is appropriate for private citizens to object to the environmental consequences of another citizen's transportation practices.

Concepts Treated:

- Citizens need to decide for themselves when it is appropriate to urge other people to change travel practices which harm the environment.
- It is often difficult to persuade people to travel in environmentally appropriate ways.
- There are effective methods by which citizens can persuade one another to travel in ways that protect the environment and conserve scarce energy resources.

ACTIVITY

Read students one of the scenarios provided at the end of the activity and have them write whether they feel the individual involved has a right to complain to the person who is allegedly polluting the environment.

During the following class period, break the students into small groups and give them written instructions to ready each other's papers and discuss:

1. Whether the individual involved is justified in complaining to the person who is polluting and why
2. If so, what methods for influencing the polluter would be most effective, and why

3. Whether individuals can reasonably be expected to take action against a polluter, and why

4. If individuals would not normally take such actions, how they could be motivated to do so

The groups then read the additional scenario and discuss it.

The groups report their conclusions to the class and respond to comments and questions from the class and you. Class discussion follows the criteria by which individual action against an alleged polluter is justified--for example, on the basis of the polluter's motives, cost to the polluter to stop polluting, employment problems for the polluter if he stops polluting, severity of the pollution, number of people affected by the pollution, opportunity for aggrieved parties to avoid the pollution, and benefits--that is, the same activity that pollutes also may confer benefits on society.

Evaluation Method:

The students decide when it is appropriate for private citizens to object to the environmental consequences of another citizen's transportation practices. They make this decision for another of the scenarios provided at the end of the activity.

Variations and Supplementary Activities:

- The students can develop their own scenarios and exchange them with other groups.
- The students can discuss when they feel it is appropriate to object to someone's use of the environment when it hampers transportation safety, convenience, or enjoyment.

SAMPLE SCENARIOS

1. Every winter morning, Mr. Jackson runs out of the house to start his car, and runs back into the house for breakfast, leaving the engine running. He does this to get the heater working and to keep the engine from stalling when he drives away. However, for five or ten minutes his exhaust system gives off gas fumes that collect around his neighbors' house, Mr. and Mrs. Jones. The Joneses feel this is very unhealthy, and it wastes gas.

Do Mr. and Mrs. Jones have the right to complain to Mr. Jackson? Why?

2. Phil is the fourteen-year-old son of Mr. O'Connor. The family lives in the city, and Phil's father works twelve miles away in a factory. Every day, Mr. O'Connor drives to work by himself even though there are a few other people in the neighborhood who work at the same plant and ride there together in a carpool.

Phil thinks his father should join the carpool to save gas, to avoid polluting the environment so much, and, for that matter, to save money. Mr. O'Connor says he wants to be able to stop off on the way home from work for errands and that he dislikes one of the workers in the carpool.

Does Phil have the right to discuss the issue further with his father? Why?

ACTIVITY #26

Mini-unit Topic: Taking Personal Actions **Approximate Class Time:** 1 period

Capsule Activity Description: Students role play scenarios in which one person complains to another that his or her travel behavior is having harmful environmental effects.

Goal:

To be familiar with several methods to persuade or encourage other people to travel in ways which protect the environment.

Concepts Treated:

- Persuading people to travel in environmentally appropriate ways is often difficult.
- There are effective methods by which citizens can often persuade one another to travel in ways which protect the environment and conserve scarce energy resources.
- Citizens need to decide for themselves when it is appropriate to urge other people to change travel practices which harm the environment.

ACTIVITY

Students role play persons objecting to a neighbor, friend, or relative's travel behavior. Sample role profiles are provided on the following pages.

After each role play, have participants read their role profiles to the class and discuss the feelings they had while role playing--in particular, "neighbors," "friends," and "relatives" discuss their emotional reactions to different approaches on the part of the "complainer" and which approaches made them more likely to discontinue the practice being objected to. Non-participants discuss what they would have said had they been involved. The class should then be encouraged to write its own profiles.

After completion of role plays, list on the blackboard the possible approaches citizens can use to influence other private citizens to discontinue harmful transportation practices. Finally, discuss whether it is

appropriate for individuals--including teenagers--to object to other people's travel behavior on the grounds that it harms the environment and, if so, when and why.

Evaluation Method:

Students evaluate which techniques used in the role plays were most effective in persuading the participants to alter their travel behaviors to protect the environment and why.

Variations and Supplementary Activities:

Students can role play scenarios in which a citizen complains about a feature of the environment over which a friend or neighbor has control that is interfering with his or her travel safety, convenience, or pleasure. Students can use the final set of role profiles for this purpose and then develop additional ones of their own.

SAMPLE ROLE PROFILES

Complainer

Every summer you and your children like to swim in Placid Pond. It's a quiet, small pond, about ten acres in size. However, your neighbor is ruining your fun. He just bought a new motorboat which he takes out on Placid Pond and generally makes a racket. He makes sure not to endanger you when you and your children are swimming, but he still makes it miserable for you with the noise. You've decided he should go to a larger lake where other boats go, rather than disturb your little pond. You have gone over to his house this afternoon and have just sat down on his porch. What will you say?

Transportation User

You have just bought a new motorboat and what fun you are having with it! You take it out almost every day on Placid Pond for a spin. It's a very small lake, about 10 acres, but you can't take it to a bigger lake because you don't have a trailer to carry it. Besides, you like the quiet of Placid Pond, and the bigger lakes would have lots of swimmers and other boats to worry about. You suspect that your neighbors are annoyed by your boat, because some of them have given you dirty looks while they were swimming and you were driving around. One of your neighbors has just come over and sat down on your porch. You wonder if she is going to complain about your motorboat.

Complainer

You are the sixteen-year-old daughter of a mother who lives in the suburbs and works eight miles away in the city. You're upset with your mother because she drives all the way in town and back every day rather than take the bus. If she rode the bus, she would have to walk 3 blocks, wait 5-15 minutes, and pay 50¢ one way. But that's not so bad--you do it every weekend when you go into town to the movies. And it costs your mother $3.00 a day to park her car in town.

You think your mother is contributing to air pollution, wasting gasoline, and ruining her nerves in the traffic. You've finally worked up the courage to confront her about it. You have just sat down to dinner. What do you say?

Transportation User

You live in the suburbs with your husband and two children, a sixteen-year-old daughter and a seventeen-year-old son. You drive to work in the city every day, even though it's an eight mile drive, because you just hate to sit in those awful buses. Besides, you would have to walk three blocks to get to the bus and pay 50¢ each way. You'd rather pay the $3.00 a day to park in a lot in the city. You'd also have to stand and wait for each bus; they run only once every fifteen minutes during rush hour.

Your daughter has made remarks to you once in a while about how you're wasting gasoline and how you come home complaining about the traffic. Now that you've just sat down to dinner, she looks as though she's going to really let you have it. How will you justify using your car if she complains about it?

Complainer

You have joined a carpool at work in an effort to save gasoline and money. Many of the other people in the factory have done the same thing. It's even turned out to be fun! You get to chat with your co-workers on the way in and back, so the drive is more interesting than it used to be. But the guy who works at the bench next to you is still coming to work in his car, all the way from Hillville, 22 miles away. This really concerns you, because here you are doing your share to conserve gasoline and he's not. There are at least two other workers who could form a carpool with him, so you've decided not to keep your feelings to yourself. It's the morning coffee break and you have just approached him to suggest he join a carpool. What do you say?

Transportation User

You live in Hillville, a small town, and work about 20 miles away in a factory. You drive to work every day, even though many of your fellow workers use carpools. You drive your own car because you can't stand to wait for someone to come pick you up, to wait for people to get together

before you can leave work, and to drive out of your way to pick up other people. Each trip would take about fifteen minutes longer for you in a carpool. You'd also have to put up with the poor driving habits of some of your fellow workers. Anyway, as long as you pay for your gasoline, why should anyone care? But here comes that guy who works at the bench next to you who's always talking about his carpool. You wonder if he's going to say something about your not being in a carpool. He'd better not!

Complainer

You, Mr. (or Mrs.) Brown, noticed the other day that your neighbors, Mr. and Mrs. Green, have planted two four-foot hemlock trees on the corner of their property. In three years, you realize, the trees will be six feet tall. This concerns you because you have two small children who, in three years, will probably play in the street every now and then despite your best efforts to prevent this. When the trees grow they are going to make it difficult for cars coming around the bend to see anyone in the street until it's too late.

There are many small children in the neighborhood, and you feel certain other parents may share your concerns. You have discussed the problem with your spouse and agreed to talk the matter over with the Greens. You spotted them this afternoon watering their trees and have walked over to see what can be worked out. Mr. and Mrs. Green have just given you a friendly "Hello!" What do you say?

Transportation Disturber

You, Mr. (or Mrs.) Green, have been upset for some time at the noise the passing traffic brings into your home. You also have a lovely living-room picture window that opens out on the busy street. So you both decided to plant two baby four-foot hemlocks in your yard to improve the view, to keep people from looking into your living room, and, hopefully, to keep out some of the sound. You bought and planted them five days ago and were told they would grow as much as a foot a year. You had considered buying bigger trees, but they were too expensive. Instead you spent 45 dollars a piece on these smaller ones--still a big investment for you.

You have noticed Mr. and Mrs. Brown, your neighbors, with their two small children, watching you on occasion as you water your trees. They seem upset, but you don't know why. In fact, Mr. (Mrs.) Green is coming over right now as you water the trees. You like your neighbors and, wondering why they seem upset about your trees, greet them with a hearty "Hello!"

MINI-UNIT 6

EXAMINING THE THEORY OF CITIZEN PARTICIPATION TO RESOLVE CONFLICTS BETWEEN TRANSPORTATION AND THE ENVIRONMENT

Mini-unit 5 focused on actions citizens can take both in their own personal behavior and in their relationships with other people to help balance the needs of transportation and the environment. This mini-unit concentrates on social and political actions citizens can take to achieve this goal.

Citizen participation can be an effective method by which the public can help achieve socially desirable goals by assisting or motivating government agencies and private organizations and businesses to harmonize interactions between transportation and the environment.

This mini-unit also focuses on the rationale for citizen participation in decision making which may affect the interrelationships between transportation and the environment--and why such action may be warranted and beneficial.

There are two additional key concepts dealt with in the unit.

- Citizens need to decide for themselves when it is appropriate to engage in citizen participation to promote harmony between transportation and the environment.
- Citizens need to develop the ability to identify methods which the public can use to effectively protest imbalances between transportation and the environment.
- Transportation planning to resolve conflicts between transportation and the environment will be effective only if criteria are established for determining what is important about transportation and the environment.*

This mini-unit can be effectively used as an introduction to the following unit in which students actually engage in citizen participation to help balance the needs of transportation and the environment. However, the unit can be used independently as a separate focus for study.

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*This concept is treated in the final activity of the unit--Activity #31. The activity is a complex one and is recommended only for eleventh and twelfth grade students with the conceptual skills to handle the issues involved.

MINI-UNIT 6 LESSON PLAN

Examining the theory of citizen participation to resolve conflicts between transportation and the environment

Activity #	*Activities*	*Class Time*
27[a] Spirit Master #5	DESCRIPTION: Students discuss what kinds of citizen participation the public can engage in to balance the needs of transportation and the environment.[a] GOAL: To know what types of citizen participation the public can engage in to promote harmony between transportation and the environment.	1 period
28	DESCRIPTION: Students role play scenarios in which community residents or groups protest harmful effects of transportation on the environment and the adverse effects some features of the environment may have on travel. GOAL: To be aware of methods citizens can use to protest imbalances between transportation and the environment.	½-1 period
29[b] Spirit Master #5	DESCRIPTION: Students discuss when to engage in citizen participation to oppose a harmful transportation effect on the environment or a feature of the environment which interferes with travel.[b] GOAL: To be able to decide when citizens should engage in citizen participation to oppose a harmful transportation effect on the environment.	1 period
30	DESCRIPTION: Students discuss what environmental criteria should be considered in transportation planning which is designed to reduce its harmful effects on the environment. GOAL: To have knowledge of several criteria transportation planners should consider in planning new or expanded transportation facilities.	1-2 periods

[a]This activity also appears in Mini-unit 1.

[b]This activity also appears in Mini-unit 4.

Total Class Time: 3½-5 periods.

ACTIVITY #27*

Mini-unit Topic: Examining Citizen Participation

Approximate Class Time: 1 period

Capsule Activity Description: Students discuss what kinds of citizen participation the public can engage in to balance the needs of transportation and the environment.*

Goal:

To know what types of citizen participation the public can engage in to promote harmony between transportation and the environment.

Concepts Treated:

- Promoting harmony between transportation and the environment is often difficult.
- The public can engage in citizen participation which will effectively help balance transportation and the environment.
- Citizens need to decide for themselves when it is appropriate to engage in citizen participation to promote harmony between transportation and the environment.

ACTIVITY

Have students write what they would do to prevent the environmental problems described in one or more of the scenarios provided on Spirit

*This activity also appears in Mini-unit 1.

Master #5.* Tell them for the time being not to consider whether they would or should take action, but to focus exclusively on what actions they *could* take which would be *effective* in solving the problems presented.

Read aloud several of the students' responses and record on the blackboard in outline form the major actions the students indicated they could take. Next, discuss, for one or more of the proposed types of citizen participation:

- *Why* they would be effective
- Whether they would be *appropriate and justifiable* actions to take
- Whether most or any people when confronted with these scenarios in real life *would actually undertake* these actions and why

Conclude the activity by asking the class to consider the merits and disadvantages of the following potential types of citizen involvement:

Writing letters or engaging in petition campaigns directed at (1) such regulatory agencies (Federal, state, local) as the Environmental Protection Agency (EPA), Federal Aviation Administration (FAA), and Civil Aeronautics Board (CAB); (2) politicians, such as Congressmen, Senators, executives (e.g., President, mayor, governor, town manager), (3) local transportation agencies, such as mass transit authorities, port authorities, department of public works, department of highways; (4) state departments of transportation; (5) local consumer protection agencies; (6) media (TV, radio, newspaper), "Action Lines;" and (7) letters to the editors of local newspapers. Such campaigns might be designed to achieve: strong or stronger legislation on such issues as pollution controls for auto exhausts, strip mining, off-shore oil drilling, speed limits for cars, snowmobile use, auto traffic in the inner city, incentives for use of carpools, use of Highway Trust Fund and other sources for financing mass transit, high taxation or rationing of gasoline, closing airports after a certain hour in the evening, airport expansion, new highway construction, billboards, automobile litter, manufacture and purchase of large cars, mph minimums for autos, free or inexpensive public transportation,

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*Since these scenarios are also applicable to Activity #29, you may want to save at least one scenario for use later with that activity.

You should also be aware that all but one of these scenarios uses the story line from the role plays provided at the end of Activity #28. In view of this repetition you may want to use only some of the scenarios. However, using the scenarios with this activity *and* using the role plays with Activity #28 will not detract from your teaching efforts because of the different instructional approaches these different activities use. Indeed, by discussing and role playing the same story dilemma, student learning may be reinforced if similar ideas are expressed, and expanded if ideas which were not expressed during the discussions occur during the role plays.

construction of subways. Alternatively, such campaigns might be aimed at strict enforcement of existing pollution laws through fines, imprisonment. and legislation.

Engaging in volunteer work with national or local environmental organizations can be effective.

Creating publicity to educate the public on issues suggested above, by means of advertisements, editorials, and feature articles in local newspapers, monthly city magazines, newsletters of community groups and unions, etc.; lectures; fact sheets, leaflets, etc.; demonstration projects; and public service announcements on radio and television.

Giving talks to clubs and organizations--fraternal societies (Elks, Masons, etc.), youth groups (Boy/Girl Scouts, etc.), civil groups (Kiwanis, Rotary, etc.) may be effective public relations as are *organizing meetings* with public and private officials and with government agencies and private companies to encourage them to adopt specific actions or discontinue current practices in order to reduce transportation's harmful effects on the environment.

Publicizing and organizing actions at one's place of employment, e.g., formation of carpools as company policy with an incentive system; provision of company shuttle bus to and from nearest public transportation facility during rush hour; subsidization of employee's transit fares and a fee for use of company parking facilities; and the provision of free parking for carpool drivers only.

Participating in transportation planning through such actions as becoming involved in the planning of Federal-aid highway projects or in the formulation of environmental impact statements. The Federal Highway Administration (FHWA) works with state highway agencies to ensure that community organizations and individual citizens are actively encouraged to participate in the planning and design of Federal-aid highway projects. Under the Federal aid program, state highway agencies initiate, plan, design, build, and operate highway projects. (The FHWA provides financial assistance and guidance and is responsible for certain key approvals.) Each state highway agency has formulated a community involvement program--part of the state's action plan--which explains the procedures that are followed.*

In addition to community involvement programs, each action plan explains how social, economic, and environmental factors are identified and studied, how the assistance of a wide range of professional skills is obtained and utilized, and how consideration of all feasible alternatives is assured in the highway planning process. Copies of action plans are

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*For further information see readings in Chapter III of this Manual and write for copies of *Getting Involved in Transportation* (U.S. Department of Transportation, Office of Consumer Affairs, 400 7th and D Streets, S.W., Washington, D.C. 20590) and *In Productive Harmony: Environmental Impact Statements Broaden the Nation's Perspectives* (U.S. Environmental Protection Agency, Washington, D.C. 20460).

available from state highway agencies or can be examined in their offices.

Action plan programs for community involvement include opportunities for interested citizens to participate in the planning and design process. In addition to public hearings, most states place emphasis on public meetings. Frequently, such meetings are conducted as workshops run with the assistance of local officials and agencies. In many instances coordination meetings are held with local officials prior to the public meetings. Under state action plans, mailing lists are maintained to provide early notification and continued information to known interest groups and individuals. Concerned citizens may contact their state highway agencies and ask to have their names placed on these mailing lists.

To ensure that environmental concerns and values are given systematic consideration equal to economic and technical considerations in the Federal decision-making process, the National Environmental Policy Act of 1969 (NEPA) requires each Federal agency to prepare a statement of environmental impact in advance of each major action, recommendation, or report on legislation that may significantly affect the quality of the human environment. Such actions may include new highway construction, harbor dredging or filling, nuclear power plant construction, large-scale aerial pesticide spraying, river channeling, new jet runways, munitions disposal, and bridge construction.

Each environmental impact statement must assess in detail the potential environmental impact of a proposed action, and all Federal agencies are required to prepare statements for matters under their jurisdiction.

The statement's primary purpose is to disclose the environmental consequences of a proposed action, thus alerting the agency decision maker and the public to the environmental risks involved.

The importance of the role citizens play in the impact statement process has been recognized by the courts. In many cases, the courts have upheld the right, or standing, of citizens to sue on environmental grounds.

Participating in demonstrations, such as picketing, rallies, sit-ins, and boycotts.

Initiating court action, such as civil action against any citizen, government agency, or government for violation or failure to enforce existing legislation--e.g., the Noise Control Act of 1972 or the Clean Air Act of 1970; and injunctions, through class action or personal suits, against industries and government agencies who pollute or plan to build or operate facilities that will have adverse effects on the environment.

Also discuss what constraints citizens must expect to cope with in attempting to take action, such as the positive effects of transportation on the environment, the social and personal needs transportation meets, and the human and economic costs involved in reducing or eliminating transportation's harmful effects on the environment. The goal of citizen participation is to resolve conflicts and create harmony among the conflicting priorities of society, transportation and the environment.

Evaluation Method:

Students describe the types of citizen action the public can engage in which will effectively solve the conflicts presented in one of the scenarios on Spirit Master #3 which they did not use during the activity.

ACTIVITY #28

Mini-unit Topic: Examining Citizen Participation

Approximate Class Time: ½-1 period

Capsule Activity Description: Students role play scenarios in which community residents or groups protest harmful effects of transportation on the environment and adverse effects some features of the environment may have on travel.

Goal:

To be aware of methods citizens can use to protest imbalances between transportation and the environment.

Concepts Treated:

- The public can engage in citizen participation which will help balance the needs of transportation and the environment.
- Citizens need to develop the ability to identify methods which the public can use to effectively protest imbalances between transportation and the environment.

ACTIVITY

Students role play citizens or members of "citizen groups" who discuss with "government officials" and "business executives" reducing or eliminating harmful environmental effects associated with transportation and features of the environment which have adverse effects on travel safety, convenience, or enjoyment. Sample role profiles are provided on the following pages.*

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*Several of these role plays use the story lines from the scenarios which are provided on Spirit Master # for use with Activities 6, 20, 27, and 29. For this activity, the scenarios have been expanded and cast into parts for two persons. In view of this repetition of "plot," you may want to use only some of the role plays at the end of this activity. However, using the role plays for this activity *and* using the scenarios on Spirit Master #5 for the other activities will not detract from your teaching efforts because of the different instructional approaches these different activities use. Indeed, by role playing and discussing the same story dilemma, student learning may be reinforced, if similar ideas are expressed and expanded if ideas which were not expressed during the role plays occur during the discussions.

After each role play, participants read their role profiles to the class and discuss the feelings they had while role playing--in particular, "public officials" and "executives" discuss their emotional reactions to different approaches on the part of "residents," and which approaches made them more likely to be firm and which inclined them to make concessions. Nonparticipants discuss what they would have said and done had they been involved. The class should be encouraged to write its own role profiles.

After completion of the role plays, list on the blackboard the possible approaches residents can use and executives can make to justify their positions, and constraints that may make it difficult for residents to succeed in their efforts.

Evaluation Method:

Students identify which forms of citizen action used in their role plays were effective and would be likely to be effective in real life situations and why.

SAMPLE ROLE PROFILES

Resident

You are Everett Smith, a teacher in the Quiet Cove junior high school and president of the Parent-Teacher Association. You have two children in the neighborhood elementary school. As a parent, resident, and teacher you are angry about the proposed expansion of the small community airport in your town to serve regional transportation needs and accommodate scheduled air carrier flights. Even now, you must stop teaching whenever a small commuter jet takes off because your students cannot hear you. When the new runway is added, it will bring the planes ever nearer the school and even closer to your house. So you have circulated a petition among the students and teachers in the neighborhood and obtained 500 signatures. In your petition you demand that the airport add a runway in a different direction. You have just walked into the office of the airport general manager, John Doe, with your petition. What do you say?

Official

You, John Doe, are the general manager of Quiet Cove Municipal Airport. Your airport is small and now serves only private aircraft and a few air taxis. The region has started to grow and several large industries would move into the area if they had better air service. The local Chamber of Commerce and regional development commission are pushing for another runway. With the technical assistance of the Federal Aviation Administration (FAA), you have decided to add a runway in the direction of the town of Quiet Cove so you will have airport service during most of the good and bad weather conditions. Although you know this will make more noise for the

Quiet Cove community as planes take off and land over their neighborhood, there is a lost of pressure on you from the airlines, the business community, and the local government officials to expand. You could expand in another direction, but to do so would involve filling in the cove; this would be too expensive, and could create problems with the natural environment. The FAA recommended solution is cheaper and probably the best compromise.

You have just ushered into your office Mr. Everett Smith, who made an appointment with you a week ago to talk over the airport expansion problem. How will you respond to him?

Resident

You, Frieda Cohen, live in a pleasant part of San Fernando, a large city with its share of traffic and parking problems. You have to fight every day to get from home to work, a mile away, and then you have a problem finding a parking place when you get home. For some time now, you have been reading about plans for the construction of a freeway, I-999, a mile from where you live to help people who want to drive into and out of the city from the suburbs. The proposed location would skirt the edge of a beautiful old park near your house. You feel that the freeway will bring more cars into the city, create more parking problems, and more air pollution. Proponents of the highway say that it will decrease travel time, increase safety by separating local and through traffic, and decrease air pollution on local streets. Finally, you get together with a group of residents and organized a citizen group called Stop I-999! You have invited the District Engineer of the State Highway Department, Mr. Bob Wilson, to your neighborhood association meeting. You will have to make a presentation to him of your group's attitudes about this highway. Everyone at the meeting is quiet and comfortable and it is time to begin. What do you say?

Official

You, Bob Wilson, are the District Engineer of the State Highway Department and have been involved for years in planning a freeway for San Fernando, a large city with more than its share of traffic and parking problems. As you see it, one way to solve some of these problems is to complete the freeway, already under construction, linking the suburbs with the city. After all, the city needs the money contributed by suburbanites in sales taxes and purchases to stay alive, and these suburbanites are tending to go to local shopping centers rather than travel by slow routes into the city. You know that some residents in San Fernando are unhappy with the highway--mainly because it is going to skirt one of the city's nicest parks--but you feel that in the long run the highway will help the city. Another reason you want this project is that you plan to run for state office next fall and you'll be able to point to it and perhaps get the suburbanites' votes throughout the state.

A Ms. Frieda Cohen has organized a neighborhood group to oppose the highway. She has invited you to their meeting, and you're about to be put on the spot. How will you respond to her presentation?

Resident

You, Pat O'Reilly, live in Littleville, a small town about forty miles from "the big city," North Neon. You like your quiet countryside, free of air pollution and noise and hordes of people. However, you have learned from the newspaper that the state highway department, with Federal assistance, plans to build a part of Interstate 44 just one mile outside Littleville. In order to locate the highway there, a bridge will have to be constructed over the best trout fishing stream in the county. The surrounding woodlands will be bisected by the highway, altering animal feeding paths. Most important, the exit at Littleville threatens to change the character of the town from a quiet rural village to a burgeoning suburb. The newspaper said the highway was being built there because it was the least expensive route--mountains, lakes and highly valued real estate in the city get in the way of other routes. But you're not interested in saving Uncle Sam money; you want your peaceful countryside left undisturbed. You got together with some townsfolk and decided you would represent the town and complain to the regional Federal Highway Administration office in North Neon. You have just walked into the office of the chief engineer, Mr. Robert Chavez. What do you say?

Official

You, Robert Chavez, are the chief engineer of the regional Federal Highway Administration in North Neon, the capitol of the state. The state and Federal governments have gotten together to build an extension to Interstate 44 about 40 miles from the city that would save drivers from one to four hours, depending on where they were traveling from and to. The best route for the highway is one mile outside of Littleville, about 40 miles south of North Neon. Any other route would be very expensive, if not impossible, because of the mountains, lakes and the need to avoid North Neon traffic. However, a representative of Littleville, Pat O'Reilly, has made an appointment to see you about the highway. You have just ushered him into your office. What if he objects to where you plan to build the highway?

Resident

You, Hilda Jones, live on Pleasant Street, a two-lane suburban street lined with trees and houses. There are quite a few children and dogs in the neighborhood who are in the habit of playing outdoors and running from one yard to another. Unfortunately, Pleasant Street is an easy connection between two main highways and has just been designated a truck route by the town engineer. Now huge trailer trucks drive down the street from dinner time until morning. The noise is disturbing and you and your children are having difficulty sleeping. There's more dirt in the house and the vibrations from the trucks shake the pictures askew. When summer comes, it will be dangerous for the children to play outdoors after dinner. When you called the office of the largest regional trucking firm to complain, you were told that the truckers need to use Pleasant Street because it saves time--and that saves everyone money on the goods the truckers are carrying. You are not satisfied with the results, so you have made an appointment with the Mayor, Louis Spontini. You have just been ushered into his office and have taken a seat. What do you say?

Official

You, Louis Spontini, have recently been elected Mayor of Suburbanville. You campaigned on a platform of progress, economic development, and jobs. One of the major contributors to your campaign was the trucker's union. At their urging, you have designated a truck route along Pleasant Street to connect two major highways. This will save the truckers time and prevent them from adding to downtown traffic congestion. There have been several complaints from residents of Pleasant Street about the noise, dirt, vibration and safety--so many that you agreed to meet with their spokesperson, Ms. Hilda Jones. She has just been shown into your office. What are you going to say to her?

Resident

You, John Le Clair, live in a poor section of town near the docks where the ships carrying produce from distant ports come to leave their cargo and pick up goods to take to other ports. The city council has been talking about renovating the harbor area in order to modernize it for the shipping industry and to develop it into a tourist attraction to bring added income into the city. The council is being urged by business interests to invest the money because, they claim, not only will the modernization benefit business, it will also provide construction jobs for the unemployed in the city. In addition, the new harbor area will contribute to the city's economic well being through taxes on the increased business activity from shipping and tourism that will result. Many city residents, too, would like to rid the community of a high-crime neighborhood which they feel is an eyesore with its bums and run-down hotels.

You live on the outskirts of the harbor and, as president of the Harbor Tenants Association, have long felt that the area is full of local color and vitality. Moreover, you are concerned that the modernization will result in the demolition of buildings where many poor and minority people live, but that very little, if anything, will be done to provide these dislocated people with substitute housing. Even if such housing is found, it will be scattered throughout the city, ruining the ethnic communities that have found some sense of neighborhood near the harbor.

You have decided to take your case to the city Port Authority to see if you can prevent the modernization from taking place or, barring that, secure a guarantee of adequate relocation benefits for your fellow harbor residents. If you can't persuade the Authority to accommodate you on either of these points, you are undecided about what course of action to take next, but you've been giving other alternatives serious thought lately, including going to the newspapers. You have just been ushered in to see the Port Authority chief of public relations, Beverly Schmidt. You shake hands and sit down. What do you say?

Official

You, Beverly Schmidt, are the chief public relations officer of the city Port Authority. The Authority is responsible for running the city's harbor. Recently, the Authority has decided in conjunction with the city council to modernize the harbor by installing up-to-date equipment to speed the loading and unloading of ships; to expand the port to accommodate the increased shipping that has occurred in the past twenty years; and to renovate the harbor neighborhood in order to remove an eyesore from the city and replace it with tourist attractions and a high-rise apartment complex. The Authority feels that this renovation will help revitalize the inner city, slow down the exodus of the middle class to the suburbs, and provide a greater tax base for the city as a result of the increased tourism, new luxury apartments, and expanded shipping business.

However, some community residents and politicians have opposed the plan on the grounds that it will require dislocating a major ethnic group which, they claim, has a thriving community next to the harbor. There is also a concern that it may disperse the harbor bums into other parts of the city where they will be just as visible and undesirable as they have been felt to be around the harbor. Although you plan to try to follow the Federal government's laws regarding compensation for displaced persons, you know that you will have a hard time convincing some people of your sincerity and that you may not be able to provide the harbor residents with adequate substitute housing and a cohesive neighborhood. In any case, there seems to be little you can do for the bums, who will be forced to leave.

John Le Clair, president of the Harbor Tenants Association, has made an appointment to see you about the harbor renovation plan, and you're afraid he might try to cause trouble if you can't meet some of his concerns. While the Port Authority has a great deal of independence and has its own sources of income, the harbor plan might have to be abandoned or modified if it becomes too much of a political football and the press begins to oppose it to strenuously. So you usher Mr. Le Clair into your office, give him a warm handshake, and ask what you can do for him.

Resident

You, Rachel Svenson, travel to and from work every day along several side streets, bucking exhaust fumes and other short-tempered drivers and wasting over an hour-and-a-half of your leisure time. You have realized for a long time that if the city would only build a highway through Paradise Park you and many of your fellow automobile drivers could reduce your commuting time in half and your daily frustration level by three-quarters. But other residents of the city have always been able to prevent such a road from being built, claiming that it would destroy the peace and beauty of Paradise Park.

Recently, the Mayor appointed a new person to be head of the city Highway Department. He, unlike his predecessors, has been sympathetic toward the idea of building a road through the park but has been strongly opposed by the city Environmental Protection Administration (CEPA). You have decided,

as a member of your local Citizens for the City Society, to have a talk with the head of CEPA in an effort to convince him of the need for the highway and, if necessary, of the voting power behind you to remove him from office.

You have engaged the services of a highway expert who has told you that not only will the highway speed up the flow of traffic, it will also reduce pollution by cutting down on the city's rush-hour stop-and-go traffic. By building attractive bridges and underpasses, "park lovers" would not be inconvenienced. You plan to refer to the successful examples of highways running through Golden Gate Park in San Francisco and Central Park in New York City. You have just been ushered into the office of Darrol Washington, chief of the city Environment Protection Administration. You shake hands and begin to present your case. What do you say?

Official

You, Darrol Washington, came to the United States from France many years ago. You had always been impressed with the way Paris officials have refused to allow high-rise buildings or major highways to be built in the city (although that has now changed, much to your regret). You immigrated to Carthage City, where you became chief of the city Environment Protection Administration (CEPA).

Off and on for the past six years you have successfully fought off attempts by the public and certain business interests to relieve traffic congestion around Paradise Park by building a highway through the park. You have always felt that roads, cars, buses, and so on have already damaged enough of the landscape, even though you realize they have also been of tremendous benefit to society. But park lands have always been especially sacred to you and the idea of putting a road through Paradise Park truly upsets you.

Recently, however, the city administration changed, and a new head of the city Highway Department has been appointed who is mounting a campaign to put in a road through the park. He argues that such a facility would actually reduce pollution by eliminating much of the stop-and-go traffic along other city streets. But you've seen how the fumes from cars in Central Park in New York City have jeopardized the health of the zoo animals in the park and how automobile traffic in San Francisco's Golden Gate Park has interfered with bicycle traffic. So you're not convinced. But you realize that you may not be able to hold off much longer. So if you must give in, you want to make sure the road is built in such a way that as much of Paradise Park's quiet, peace, natural beauty, and pedestrian and bicycle opportunities are left undisturbed.

Right now, you have an appointment with a Ms. Rachel Svenson who represents a local citizens group which advocates the construction of the highway. You usher her in and ask her what you can do for her.

ACTIVITY #29*

Mini-unit Topic: Examining Citizen Participation

Approximate Class Time: 1 period

Capsule Activity Description: Students discuss when to engage in citizen participation to oppose a harmful transportation effect on the environment or a feature of the environment which interferes with travel.*

Goal:

To be able to decide when citizens should engage in citizen participation to oppose a harmful transportation effect on the environment.

Concepts Treated:

- There are many times when it is appropriate for the public to engage in citizen participation to oppose a harmful effect of transportation on the environment or to correct a hindrance to travel caused by the environment.
- Citizens need to be able to identify when citizen participation is justified to oppose a transportation vehicle or facility which has or will have harmful effects on the environment.
- Citizens need to develop the ability to resolve conflicts between transportation and the environment.

ACTIVITY

Give students one of the scenarios provided on Spirit Master #5** or a scenario you or the students themselves develop for the activity. Have

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*This activity also appears in Mini-unit 4.

**All but one of these scenarios uses the story line from the role plays provided at the end of Activity #28. In view of this repetition you may want to use only some of the scenarios. However, using the scenarios with this activity *and* using the role plays with Activity #28 will not detract from your teaching efforts because of the different instructional approaches these different activities use. Indeed, by discussing and role playing the same story dilemma student learning may be reinforced, if similar ideas are expressed, and expanded if ideas which were not expressed during the discussions occur during the role plays.

students write whether they feel the citizen affected in the scenario by the harmful transportation effect or feature of the environment has the right to engage in citizen participation to oppose or alter it and why.

During the following class period, break the students into small groups and give them written instructions to read the papers of the other members of their groups and try to reach a consensus on:

1. Whether the citizen described in the scenario is justified in taking action against the harmful transportation effect or feature of the environment

2. Why the citizen should or should not take action

3. What the nature of the transportation effect or feature of the environment would have to be--how serious, how many people affected, etc.--before citizen participation would be justified

Then have the groups describe their conclusions to the class, allowing other groups to comment on the presenting group's idea.

Finally, conduct a class discussion around whether or when the following considerations would warrant citizen participation against the use of a vehicle or transportation facility which is having harmful effects on the environment or against a feature of the environment which interferes with travel safety, comfort, or enjoyment:

- How many people must be affected vs. how many are benefited?
- How much are the people harmed vs. how much are other people benefited?
- Did the affected people move into the area after the problem existed?
- Are there personal, inexpensive preventive measures citizens can take to reduce or eliminate the problem?
- Are there important transportation needs the mode of travel or facility meets that outweigh its harmful effects?
- Are there constraints--time, financial, technological--that make it difficult or impossible to solve the problem?

Evaluation Method:

Students decide whether citizens should engage in citizen participation in one of the scenarios provided on Spirit Master #5 which was not used during the activity.

ACTIVITY #30

Mini-unit Topic: Examining Citizen Participation

Approximate Class Time: 1-2 periods

Capsule Activity Description: Students discuss what environmental criteria should be considered in transportation planning which are designed to reduce transportation's harmful effects on the environment.

Goal:

To have knowledge of several criteria transportation planners should consider in planning new or expanded transportation facilities.

Concepts Treated:

- Transportation planning to resolve conflicts between transportation and the environment will be effective only if criteria are established for determining what is important about transportation and the environment.
- Criteria for transportation planning to balance the needs of transportation and the environment must consider both the beneficial and harmful effects of transportation on the environment and also the effects features of the environment have on travel.

ACTIVITY

During the first class, have your students write their response to the following scenario:

> You are the State Commissioner for Environmental Protection. The Governor wants to build a new airport near the State Capitol. But first she needs to know from you what environmental concerns and issues she should be aware of before she builds it. For example, should she think about the problem of noise pollution? She doesn't want you to solve these problems, she just wants to know *what the problems are.* Interpret "environmental" as broadly as possible--all the possible effects, good and bad, a new airport could have on the community.

During the following class period, break the students into small groups and give them these written instructions.

1. Compare the environmental concerns and issues each student said should be considered in building a new airport.

2. Discuss which ones should be considered in transportation planning *in general*--building highways and roads, truck terminals, mass transit facilities, etc. (It may be helpful for students thinking of these concerns to imagine what environmental issues they would want to consider if they were building a bus station, highway, parking garage, truck terminal, harbor, or dock.)

Have each group report on all the concerns it listed, including those considered for the airport-building project as well as other projects, such as highways, garages, truck terminals. During a full class discussion, guide students to develop a list of environmental criteria that should be considered in transportation planning in general. It will probably be necessary for you to help the students to make the transition between discussing transportation issues or concerns and identifying transportation planning criteria. For example, the specific concern about the taking of homes by eminent domain for a transportation facility will lead to establishing the more general criterion of what type of land it is appropriate to take for a transportation facility.

Some of the criteria on the list developed by the class might be:

1. How many people are negatively affected vs. how many people will benefit?

2. How serious are the negative effects? How beneficial are the positive effects?

3. Are there any opportunities for those affected to avoid the negative effects?

4. Will there be damage to the natural environment--for example, to wildlife, open space, plants, trees?

5. Will there be negative effects on through traffic near the new airport site?

6. Can major changes in land use around the proposed site be anticipated?

7. Are there potential long-range dangers (weather modification, health, ecological balance)?

Evaluation Method:

Students identify and defend the appropriateness of sample criteria planners should use in deciding what transportation facilities to construct or renovate.

Variation and Supplementary Activity:

Another approach to this activity is to have your students focus only on one project. Ask them to pretend they are in charge of planning an airport for their community. Have them imagine what concerns they would have about the airport's effects on the environment. Record these concerns on the blackboard and then help the class to generalize from these concerns to as to develop a set of general environmental criteria transportation planners should consider.

For example, if a student suggests he or she would be concerned about noise pollution from landing and departing planes, point out that this involves an environmental criterion of determining and considering a transportation facility's noise impact on citizens. Other important environmental criteria to discuss are:

- The potential air pollution (e.g., expected pollution from cars using a new freeway; potential air pollution in the atmosphere from supersonic aircraft)
- The destruction of scenic land (e.g., clearing of parks, trees, etc., for a highway)
- The displacement of persons (e.g., seizing houses by eminent domain for a new airport)
- The impact on the general quality of life (e.g., reducing recreational areas through the construction of a cross-town expressway)
- The impact on population shifts (e.g., encouraging more people to leave the inner city by facilitating the transportation of suburbanites into the city on expressways)
- The secondary effects of transportation planning (e.g., creation of parking problems in a city by building a new highway)
- The visual effects or esthetic considerations (e.g., billboards, unsightly construction of above-ground utility poles, traffic lights, litter)

MINI-UNIT 7

ENGAGING IN CITIZEN PARTICIPATION TO RESOLVE CONFLICTS BETWEEN TRANSPORTATION AND THE ENVIRONMENT

In the previous mini-unit students discussed the "theory" of citizen participation to balance the needs of transportation and the environment. In this mini-unit students put their ideas to work by engaging in social and political action designed to promote a balance between the often conflicting needs of transportation and the environment. However, while the previous unit provides an excellent introduction to the work required in this one, students need not have studied the previous one in order to engage in this one effectively.

The goal of this unit is to enable students to experience and practice citizen participation in a manner which allows them to express and analyze their feelings and actions. The results of this analysis should motivate students to engage in other citizen participation ventures in the future and enable them to do so effectively.

Three key concepts the unit treats are:

- Citizens need to be able to determine when citizen participation is justified to oppose a transportation vehicle or facility which will have harmful effects on the environment or a feature of the environment which will have adverse effects on travel.
- Citizens need to develop the ability to resolve conflicts between transportation and the environment through citizen participation.
- Young citizens need to familiarize themselves with effective means of participation.

Types of citizen participation presented in the activities include analyzing a highway construction project, participating in a public hearing, developing an educational campaign for the community, and engaging in volunteer work with local environmental organizations.

As you can see from the above list of suggested citizen participation ventures, the unit provides activities which students in some communities will not be able to implement. You will need to decide which activities are feasible in your community and appropriate to the capabilities of your students.

MINI-UNIT 7 LESSON PLAN

Engaging in citizen participation to resolve conflicts between transportation and the environment

Activity #	*Activities*	*Class Time*
31	DESCRIPTION: Students engage in citizen participation to reduce transportation's harmful effects on the environment or hindrances to travel caused by features of the environment. GOAL: To know how to engage effectively in citizen participation.	2-6 periods, plus out-of-class time
32	DESCRIPTION: Students analyze a current, planned, or proposed highway or road construction project to balance travel needs with environmental safeguards and then present recommendations to the appropriate authorities. GOAL: To know the process involved in citizen participation in transportation decision making.	1-3 periods, plus out-of-class time
33	DESCRIPTION: Students participate in a hearing on transportation's effects on the environment. GOAL: To know how to participate effectively in a public hearing.	1½-4 periods, plus out-of-class time
34	DESCRIPTION: Students develop and implement an educational campaign in their community on transportation's effects on the environment and obstacles to travel created by features of the environment. GOAL: To know how to inform the public about issues related to transportation and the environment.	2½-6 periods, plus out-of-class time

MINI-UNIT 7 LESSON PLAN (CONTD.)

Engaging in citizen participation to resolve conflicts between transportation and the environment

Activity #	*Activities*	*Class Time*
35	DESCRIPTION: Students engage in volunteer work for organizations devoted to reducing transportation's harmful effects on the environment. GOAL: To know how citizens can help engage in volunteer work to help balance the needs of transportation and the environment.	1 period, plus out-of-class time

Total Class Time: 8-20 periods.

ACTIVITY #31

Mini-unit Topic: Engaging in Citizen Participation

Approximate Class Time: 2-6 periods, plus out-of-class time

Capsule Activity Description: Students engage in citizen participation to reduce transportation's harmful effects on the environment or hindrances to travel caused by features of the environment.

Goal:

To know how to engage effectively in citizen participation.

Concepts Treated:

- Citizens need to be able to determine when citizen participation is justified to oppose a transportation vehicle or facility which is or will have harmful effects on the environment; or a feature of the environment which has or will have adverse effects on travel.
- Citizens need to develop the ability to resolve conflicts between transportation and the environment through citizen participation.
- Young students need to learn how to plan an effective citizen participation action.

ACTIVITY

In small groups students develop and execute a course of action designed to reduce transportation's harmful effects on the environment or an obstacle to travel safety, convenience, or enjoyment caused by a feature of the environment.

The group selects a harmful effect that it would like to reduce or eliminate and decides whether political or social action on its part can achieve such a reduction and whether it would be appropriate for it to take action. Such actions might include:

- Reducing traffic congestion at a certain location in the community
- Promoting the development of a carpool system in a local industry or company

- Taking steps to reduce vandalism on public transportation vehicles

- Encouraging classmates or other members of the community to increase their use of public transportation or carpools

- Supporting, opposing, or seeking to alter a planned highway or road construction project in the community

- Seeking to have a speed lane implemented on a local highway or road for buses and for cars with more than two occupants

- Developing a plan to reduce raucous noises from fellow students' motorcycles and automobiles

- Seeking to have a feature of the environment altered or removed which interferes with travel safety, convenience, or enjoyment in the community

Each group decides exactly what its objective is--what it expects to achieve, defined in measurable terms--e.g., 20 percent fewer commuters driving their cars to work; and what may make it difficult to achieve its objective. The group then develops a detailed plan for achieving its objective, in sequential steps, and determines who is going to engage in which tasks. The plan might include:

- Interviewing the people who are most affected by the harmful effect to learn what they would like done about it

- Interviewing other people who may be adversely affected by the group's proposed actions to learn why they may not want the group to act and to learn whether a compromise position may be possible which accomodates those who are bothered by the harmful effect and those who will be adversely affected if the harmful effect is abolished or altered.

- Talking with appropriate community officials about the problem and what steps might remedy it

- Deciding how to achieve its goal in terms of who they must talk to and persuade to act, what actions each of these persons must take, and how these people can be motivated to take the desired actions

- Talking with the appropriate people

Before engaging in action, each group

- Considers the justifiability of its methods and questions whether they are ethical.

- Each plan is reviewed for effectiveness and justifiability by you and appropriate community officials or "experts," such as district attorney's office, conservation club, or consumer protection agency or organization.

The groups then engage in action, with each member keeping a log of his actions and their effects.

After engaging in its political or social action, each group:

- Evaluates the extent to which it achieved its objectives
- Discusses why the action succeeded or failed
- If it failed, discusses what might have been done differently to make it succeed
- Prepares articles for submission to school or community newspaper on its activity
- Prepares a report to the class

The groups then present their report to the class and respond to comments and questions from you and the other students.

Evaluation Method:

The students write a booklet for use in the town or school library which describes the steps necessary to engage in citizen participation to resolve conflicts between transportation and the environment.

ACTIVITY #32

Mini-unit Topic: Engaging in Citizen Participation

Approximate Class Time: 1-3 periods, plus out-of-class time

Capsule Activity Description: Students analyze a current, planned or proposed highway or road construction project to balance travel needs with environmental safeguards and then present recommendations to appropriate authorities.

Goal:

To know the process involved in citizen participation in transportation decision making.

Concepts Treated:

- Citizens need to be able to identify when citizen participation is justified to oppose a transportation vehicle or facility which has or will have harmful effects on the environment; or a feature of the environment which has or will have adverse effects on travel.
- Citizens need to develop the ability to resolve conflicts between transportation and the environment through citizen participation.
- Citizens need to understand the varied and often opposing considerations that must be examined during the process of transportation decision making.

ACTIVITY

You or your students contact the local highway or transportation department to identify a project in the community involving highway or road construction. Students obtain from those agencies and other sources information and literature about the construction in terms of the proposed route, environmental effects, benefits to the community, and special features (width, etc.).

Divide the class into small groups and have each group discuss how it thinks the road or highway should be built so as to harmonize the need for the highway or road with concerns to preserve and enhance the environment. Suggested questions to use in conducting this analysis follow.

What are the benefits the proposed highway will have? Will those who benefit be suburban commuters, inner-city poor, rural farmers, construction workers (through employment building the facility), truckers, motel companies, or other commercial enterprises? Will individuals and groups benefit in terms of less time expended commuting to work, improved garbage collection, better emergency service, improved access to other forms of transportation, speedier bus service, or greater profits for businesses? Will the highway benefit the environment by reducing stop-and-go traffic, by the diversion of traffic from elsewhere and reduced traffic congestion, by providing better access to parks and historical sites, or by providing scenic views and the development of attractive architecture (bridges, landscaping)?

What effects will the highway's route have on transportation safety, convenience, and enjoyment? Will it, for example, promote convenience by cutting travel time for cars and buses? Will it make travel more enjoyable by providing scenic views?

What beneficial effects will it have on the environment? What harmful effects will it have such as damage to wildlife, parks, historical sites; pedestrian problems; displacement of homeowners, renters, or businesses; obstruction of scenic views; creation of noise problems for pedestrians, dwellers, schools, construction of potentially undesirable service facilities (e.g., gas stations, restaurants); and increased congestion in other parts of the community?

How could the route be altered so that the highway or road's transportation benefits and benefits to the environment could be enhanced and its harm to the environment reduced or eliminated? How could the highway or road's *features* be developed so these goals could best be achieved? For example, should parts or all of it be elevated or be below street level? How wide should it be? Should it be a restricted access highway?

Should there be any restrictions on *use* of the highway or road which would help balance the needs of transportation and the environment? For example, should the road exclude trucks; have a minimum speed limit; or provide special bus lanes?

When each group has discussed and answered these questions, it formulates a series of recommendations for improving the highway or road and presents them to appropriate community agencies, such as the highway department, the environmental protection agency, the department of transportation, or during hearings on the proposed construction. Each group asks if its ideas have been (or will be) considered and why they were (or may be) rejected (e.g., because of cost considerations, political problems). Following the interviews, the groups discuss the reasons why their suggestions were (or will be) rejected or accepted and decides whether those reasons were valid ones. The groups conclude the activity by reporting their results to the class.

Evaluation Method:

The students develop a flyer for the school or town library which describes some of the major steps involved in citizen participation in transportation decision making. They base it on their experience during the activity.

Variations and Supplementary Activities:

- If no highways or roads are being planned or constructed in a community, the groups can analyze a previous and completed highway construction project in terms of how well it balanced the needs of transportation and the environment.
- The activity can be a class activity or individual student assignment.
- The activity can be conducted around planned or recent airport or harbor construction.

ACTIVITY #33

Mini-unit Topic: Engaging in Citizen Participation

Approximate Class Time: 1½-4 periods, plus out-of-class time

Capsule Activity Description: Students participate in a hearing on transportation's effects on the environment.

Goal:

To know how to participate effectively in a public hearing.

Concepts Treated:

- Citizens need to be able to identify when citizen participation is justified to oppose a transportation vehicle or facility which has or will have harmful effects on the environment; or an environmental feature which has or will have adverse effects on travel.
- Citizens need to develop the ability to resolve conflicts between transportation and the environment through citizen participation in public hearings.
- Attending public hearings is one effective form of citizen participation in which individuals can engage.

ACTIVITY

Students research the accessibility of public hearings on transportation's effects on the environment, plan a position statement they would like to present, and participate in the hearing.

Students can consult the reading on the following pages, as well as Chapter III of this Manual, for information on mechanisms for public participation. To learn when local hearings on environmental issues are taking place, students can consult the following sources: announcements in local newspapers; local agencies responsible for environmental affairs, consumer affairs, transportation planning; state highway agencies; regional offices of the U.S. Environmental Protection Agency; and local citizens groups involved with environmental or conservation issues.

After learning what hearings are being held and when, the class decides which hearing to attend, becomes informed about what issues will be dealt with, and decides what its position should be on those issues. The

class then decides what it must do to prepare for the hearing, what to do at the hearing, and what follow-up actions to take after the hearing. Suggestions for executing these tasks are provided on the following pages.

After the hearing, the class analyzes the results, particularly in terms of the impact their efforts had or may have on the final decisions made about the hearing issues.

Evaluation Method:

The students develop a booklet entitled "A Citizen's Guide to Public Hearings," which explains why the public should participate in public hearings on transportation issues and describes how to do so effectively.

Variations and Supplementary Activities:

- Students can plan what they should do at the hearing without actually attending the hearing.
- Several small groups can conduct the activity, each advocating different positions or the same position at the hearing.
- Students can research the role of zoning and regional transportation planning and assess what the community's role can be in such planning.
- Students can role play a hearing.

PUBLIC HEARINGS*

Another way to communicate with the public is to testify at public hearings. Your objectives should be two-fold: (1) to get your views before the control agency or legislative body holding the hearing; (2) to air your views through the press and broadcast media.

The following suggestions are based on the experiences of many citizen organizations that have been through the earlier stages of the fight for clean air. Your group may be one of them, but you may, nevertheless, find these suggestions helpful:

**Clean Air. It's Up to You, Too.* Office of Public Affairs, U.S. Environmental Protection Agency, Waterside Mall, Washington, D.C. 20460. It should be noted that citizens need to be alert--by reading newspapers and listening to the radio--to notices that a hearing is going to be held.

Before the Hearing

1. Prepare a typewritten statement and make copies.

2. Prepare a press release and deliver it at least one day before the hearing, with a copy of your statement. Be sure both the release and the statement are marked "Advance Copy--Not for Release Until . . ." (Insert date and time when you expect to present the statement.)

3. If possible, deliver the release and statement to your press contacts personally. If you can't do so, call and tell them the release and statement are on the way. Don't waste reporters' time discussing or reading the release or statement on the phone unless they ask you to.

This advance press work does several things: it reminds the press that the hearing is coming up; it shows your press contacts that you've thought of them, even though they know you want coverage; and, if they cannot cover the hearing, at least they have your statement.

At the Hearing

1. Have a prepared typewritten statement, with enough copies for each member of the committee or board or commission conducting the hearing, plus extras for their files, and have more copies for the press along with your press release.

2. Be brief. Speak no more than four or five minutes, but ask to have your full statement included in the hearing record.

3. Begin with your name, address, title or group affiliation, and cite other groups, if any, that support your position and have asked you to say so.

4. Tell why you support, or oppose, the subject under consideration. Give facts to support your position. Don't make accusations you cannot support.

5. If appropriate, explain how the public interest is affected, who will benefit, and how much it will cost.

6. If your group has several spokesmen, make sure to avoid repetition unless emphasis is desired. Have each speaker cover a different point, or approach the problem from a different aspect.

7. Speak clearly--loudly enough to be heard, slowly enough to be understood, but quickly enough to keep the listeners' attention.

8. Be prepared to answer questions--to explain your position, to explain the purpose of your group, to explain how your group's position was reached (executive board vote, membership meeting vote, mail referendum, etc.). If you don't know the answer to a question, say so, and offer to try to get the answer and send it in for the record. On rare occasions, a committee or board member may be hostile and attempt to rattle, confuse, irritate or intimidate you. Don't let yourself get confused, angry or nasty. Keep your cool.

9. Try to have as many supporters as possible attend the hearing. Casually mention their presence in your opening comments. Some call this "packing a hearing." Others call it "showing strength and support." Numbers reinforce your stand. An indication of support can sway legislators as well as public opinion.

10. Listen carefully to other statements presented, especially by the opposition. Make note of factual errors or new ideas or proposals, for you may be asked to comment on what other witnesses say. If so, don't attack the opposition or make personal remarks.

11. Respect the right of others to disagree with you. Do not applaud or show disapproval of any speaker.

12. If you have written statements of community leaders, other organizations, etc., who support your position but could not attend the hearing, ask that the statements be included in the hearing record.

13. Thank the committee for giving you the opportunity to testify.

After the Hearing

1. Promptly prepare and submit answers to any questions you were asked but could not answer at the hearing. If you think any statements made by the opposition were factually incorrect or need rebuttal, prepare and submit a supplementary statement for the record. But don't rehash what you said in your original statement.

2. If your press contacts wrote or broadcast stories containing your views, phone them and thank them for the coverage.

3. Don't complain to the press if your views weren't included in their coverage or if you think the coverage was bad or that you were misquoted.

4. A few days after the hearing, send a letter to the newspaper editor for publication referring to the hearing and pointing out what, if anything, the public can do to help.

5. Let your own members know what happened at the hearing through your organization's newsletter or by a special letter to all members and include copies of press clippings, if any.

ACTIVITY #34

Mini-unit Topic: Engaging in Citizen Participation

Approximate Class Time: 2½-6 periods, plus out-of-class time

Capsule Activity Description: Students develop and implement an educational campaign in their community on transportation's effects on the environment and obstacles to travel created by features of the environment.

Goal:

To know how to inform the public about issues related to transportation and the environment.

Concepts Treated

- Citizens need to be able to determine when citizen participation is justified to oppose a transportation vehicle or facility which has or will have harmful effects on the environment; or a feature of the environment which interferes with travel safety, convenience, or enjoyment.
- Citizens need to develop the ability to resolve conflicts between transportation and the environment through participation in public education campaigns.
- Public education is one effective form of citizen participation in which the public can engage.

ACTIVITY

The students implement a plan to educate the community, or part of it, to the nature and extent of transportation's effects on the environment and hindrances to travel caused by features of the environment. The education plan also instructs the public as to how it can balance the needs of both transportation and the environment.

Before developing the plan, students determine the following:

1. What specific *issue* they will deal with.
2. What *target groups* in the community to "educate" (unless the class decides to gear its campaign to the entire community), such as public

officials, employees of a business, junior high school students, lawyers, housewives. Rotary, Kiwanis, Chamber of Commerce, students' own parents, teachers, or residents of a particular part of town or street. The class selects a target audience that is in need of being "educated," one that is not already well informed, is not already taking appropriate actions, and is in a position to take meaningful action if supplied with relevant information and motivation.

3. What *media or channels of education* are available to the class in its community for educating the public, such as radio, television, distribution of fact sheets, library handouts, public lectures, speeches and discussion with community groups and leaders, and school assemblies. The class identifies these potential media so that any plan it develops can in fact be implemented. Identifying them may require interviews and phone calls to responsible media authorities to learn whether students will be able to implement their campaign through these media.

4. What *objectives* it wants to achieve and what, precisely, it hopes to accomplish. If interest and time is available, the class can conduct a pre-test of the target audience in the community and compare findings with a test at the end of the campaign. An example of a realistic objective might be: the target group demonstrates the awareness in an interview that transportation has serious effects on air pollution and shows the ability to identify at least two actions it can take to reduce those effects.

5. What *information and attitudes* to convey to the target audience to achieve the objective(s)--for example, information on the relationship between cars and air pollution and methods for reducing automobile use which are compatible with the positive benefits cars provide.

6. The *educational strategy* by which to present the information and achieve the objectives.

7. The *media* by which to convey the information--lectures, handouts, television, etc.

The class then presents the plan to appropriate "reviewers," such as a local transportation agency, conservation organization, and the media, for suggestions on how to improve it. The group then develops the plan and implements it.

After the campaign, the class evaluates the results in terms of how well the objectives seem to have been achieved, using interviews, polls, or observation of target group's behavior.

Evaluation Method:

The students develop a brochure for library use which informs the public about the key interrelationships between transportation and the environment, how these interactions may affect them, and what they can do about those which are harmful.

Variations and Supplementary Activities:

- The class can write up results for submission to school and community newspapers.
- Several small groups can conduct different educational campaigns and compare approaches, objectives, target audiences, and results.
- The activity can be a discussion on how to educate the public.

ACTIVITY #35

Mini-unit Topic: Engaging in Citizen Participation

Approximate Class Time: 1 period, plus out-of-class time

Capsule Activity Description: Students engage in volunteer work for organizations devoted to reducing transportation's harmful effects on the environment.

Goal:

To know how citizens can engage in volunteer work to help balance the needs of transportation and the environment.

Concepts Treated:

- Citizens need to be able to determine when citizen participation is justified to oppose a transportation vehicle or facility which is having or will have harmful effects on the environment.
- Volunteer work is one effective form of citizen participation in which the public can engage to harmonize the interests of transportation and the environment.

ACTIVITY

You and your students identify organizations that might welcome volunteer workers. Examples are on the following page. Interested students determine whether these organizations want and need volunteer workers, what kind of work they have available, and what types of volunteers they will accept. The students--individually, in groups, or as a class--then select an organization with which to do volunteer work.

The students draw up a list of questions about transportation's effects that they hope their volunteer experience will answer. Sample questions include:

1. What specific harmful effects of transportation on the environment does this organization seek to reduce? Or, what specific beneficial effects does it seek to preserve?

2. Will the reduction of these harmful effects involve sacrificing any of transportation's benefits to society? If so, is the sacrifice worth it? Why?

3. What are the methods by which the organization seeks to reduce them? Are these methods working? Why or why not? What constraints make it difficult for the organization to achieve its goals?

4. Are there other methods that would be more effective? If so, why aren't they used by this organization?

5. Are there ways other private citizens could be encouraged to engage in similar volunteer work, if such work would be helpful?

The volunteers keep a log of their impressions and experiences. Either during or after the experience, the volunteers present reports to the class on their work and share with the class the answers to the above or similar questions.

Sample organizations and agencies that may either welcome volunteer work or be able to identify other organizations that do are listed below. Consult the telephone directory for local offices or branches or write to their national headquarters.

SAMPLE VOLUNTEER ORGANIZATIONS

National Audubon Society
950 Third Avenue
New York, New York 10022

The Sierra Club
1050 Mills Tower Building
San Francisco, California

Roadside Councils in Phoenix, Arizona; San Francisco, California; Denver, Colorado; Maplewood, New Jersey; Cleveland, Ohio; Portland, Oregon; Honolulu, Hawaii; Seattle, Washington; Milwaukee, Wisconsin; Springield, Vermont; and Media, Pennsylvania

Bureau of Outdoor Recreation
Deaprtment of the Interior
Washington, D.C. 20240

The Conservation Foundation
1250 Connecticut Avenue N.W.
Suite 700
Washington, D.C. 20036

Keep America Beautiful
99 Park Avenue
New York, New York 10016

General Federation of Women's Clubs
1734 N Street N.W.
Washington, D.C. 20036

Men's Garden Clubs of America
626 High Street N.E.
Salem, Oregon 97301

National Council of State Garden Clubs
309 Rockwell Terrace
Frederick, Maryland 21701

Evaluation Method:

The students develop a flyer for the library which indicates how other students can engage in volunteer work designed to resolve conflicts between transportation and the environment and indicates why such work is valuable.

Variation and Supplementary Activity:

The students can form a committee to act as ombudsman for complaints about transportation's harmful effects on the environment and obstacles to travel created by features of the environment. For each complaint it hears, the committee can

1. Question the "plaintiff" to obtain all relevant information, such as dates, exact nature of the effect, why it is perceived as being harmful, and willingness of "plaintiff" to see the problem through to a resolution

2. Inform the "plaintiff" that the committee does not guarantee any results, nor does it necessarily agree with the "plaintiff's position

3. Decide whether it will handle the case based on transportation's (or the environment's) beneficial effects as well as harm to society

4. Decide how it will handle the case: what further information it may need before talking with the alleged offending party; how it expects to overcome constraints to solving the problem; how it should approach the alleged offender; whether the committee should act as a group, with or without the consumer, or designate one of their number to take the agreed-upon action.

MINI-UNIT 8

RESEARCHING ISSUES RELATED TO TRANSPORTATION AND THE ENVIRONMENT

This final mini-unit consists of five research activities. Individual students can pursue those activities which interest them, or the class can be divided into small groups with each group pursuing a different research activity. Finally, the activities can also be used as extra credit assignments or as independent study exercises for students who wish to learn more about transportation and the environment on their own.

The activities deal with three different aspects of transportation and the environment. The first three activities focus on the effects of transportation on the environment; the fourth treats public attitudes toward those effects; the last involves investigating political considerations in trying to balance the needs of transportation and the environment.

The mini-unit (see the footnotes on the first page of Activities #36 and 37) also seeks to make clear to students that highways are not the only transportation facility that affects the environment: airports create noise pollution, for instance, and new airports and airport expansion displace residences and businesses. Light rail also creates displacement problems.

Key concepts addressed in the unit include the following:

- Highways, roads, and other facilities which make automobile travel possible consume a large percentage of land in the average community.
- Highways, roads, and other facilities which make automobile travel possible also provide considerable employment in the average community. (Nationally, one out of six jobs stems from the use of automobiles.)
- Highway and road construction and other transportation facilities often require residents and businesses to relocate.
- Citizens need to evaluate the effects of highway construction projects on land use and on the displacement of citizens and businesses in determining whether a proposed transportation construction project should be undertaken.
- The extent to which conflicts between transportation and the environment can be resolved depends to a large extent on public awareness of the conflicts and willingness to help resolve them.
- There are many political considerations which can make it difficult or impossible for citizens to effectively balance the needs of transportation and the environment.

By engaging in these research activities independently or in small groups, students will be able to share what they learn about these major transportation and environmental issues and pool their combined knowledge into a comprehensive understanding of the relationship between transportation and the environment in America today.

MINI-UNIT 8 LESSON PLAN

Researching issues related to transportation and the environment

Activity #	*Activities*	*Class Time*
36	DESCRIPTION: Students research the extent to which automobile service facilities consume land and provide employment in their community. GOAL: To be aware of the extent to which automobile travel requires land use in the local community.	1½-3 periods, plus out-of-class time
37	DESCRIPTION: Students research the effects of highway, road, and other transportation facility construction on the displacement of persons, businesses, and community facilities. GOAL: To know what the effects of highway and other transportation facility construction are on the displacement of citizens and buildings.	2-3 periods, plus out-of class time
38	DESCRIPTION: Students take field trips to different agencies and individuals to learn about transportation's effects on the environment. GOAL: To know what some of the effects of transportation are on the environment.	2-3 periods, plus out-of class time
39	DESCRIPTION: Students poll the public on its knowledge about and attitudes toward conflicts between transportation and the environment. GOAL: To know what the public's attitudes are toward conflicts between transportation and the environment.	2-4 periods, plus out-of class time

MINI-UNIT 8 LESSON PLAN (CONTD)

Researching issues related to transportation and the environment

Activity #	*Activities*	*Class Time*
40	DESCRIPTION: Students research the politics involved in citizen participation designed to balance the needs of transportation and the environment. GOAL: To be aware of the political constraints which hamper citizen efforts to balance transportation and the environment.	1½-3 periods, plus out-of-class time

ACTIVITY #36

Mini-unit Topic: Researching Transportation and the Environment

Approximate Class Time: 1½-3 periods plus out-of-class time

Capsule Activity Description: Students research the extent to which automobile service facilities consume land and provide employment in their community.

Goal:

To be aware of the extent to which automobile travel requires land use in the local community.

Concepts Treated:

- Highways, roads and other facilities which make automobile travel possible consume a large percentage of land in the average community.
- Highways, roads and other facilities which make automobile travel possible also provide considerable employment in the average community.
- Citizens need to assess the relative advantages and disadvantages of using local land space for automobile travel instead of putting the land to other uses.

ACTIVITY

Small groups of students research the extent to which automobiles and facilities that service cars take up land in their community.* Groups also determine the employment opportunities such property provides.

The groups begin by identifying facilities that are used for servicing automobiles. They include gas stations, highways and roads, parking lots and garages, new and second hand car stores, car washes, bridges, and rotaries. The groups obtain maps of the community and designate sections of the city for each student to study. The students develop a labeling system so that each student labels gas stations on the map as "GS", for example, and so on.

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*Students can also research the extent to which airports and mass transit facilities take up land and provide employment in their community.

Next, the students research how much land is used by each facility and how many jobs it provides. They conduct the study by visiting assigned sections of the community with their maps, indicating on the maps the property in the community taken up by automobile service facilities and recording the number of people employed at each facility.

After the study has been completed, the groups develop a composite map of the community in which all areas that are used for servicing automobiles are shaded, indicating clearly what percentage of the community is left for nonautomotive purposes. The groups then compare results with the national averages for cities: one-third of the land area of cities is used by businesses which cater exclusively to the automobile; one-third is used by roads and highways.

Then the students indicate, beside each shaded area on the map, how many people are employed at each facility. Students calculate what percentage of all local jobs is represented by these auto-related jobs. Students compare this percentage with national figures: 16 percent or one of 6--of all jobs--stem from use of the automobile.

Groups then assess the relative advantages and disadvantages these facilities provide the community by examining four major considerations:

1. What basic transportation services do the facilities provide the community in terms of commuting, recreation, shopping, goods movement, and other necessities and amenities? Do these facilities displace other workers?

2. What employment opportunities do these facilities provide, and could the persons employed by them find jobs elsewhere?

3. Could areas of land currently used for automobile travel and support services be profitably put to other purposes, such as parks, trees, housing, open space, or sports facilities? Could these other uses provide jobs for any or all of the people currently employed by the automobile-related facilities? Would these new jobs provide each worker with the same income? How many workers would have to be retrained for the new jobs? Who would pay for the retraining?

4. Does the community want local land use and local jobs to be revised in this manner? (Students can conduct a poll in the community to determine local sentiment on this issue.)

Finally, the groups prepare and present a report on their findings and respond to comments and questions from you and the rest of the class.

Evaluation Method:

Students advocate or oppose the taking of more land in their community for automobile or highway purposes in mock "editorials" for the local newspaper.

Variations and Supplementary Activities:

- Students can indicate on their map automobile-related services, like movie drive-ins and car-hops.

- Students can research what, if anything, was destroyed to make way for the facilities servicing automobiles.

ACTIVITY #37

Mini-unit Topic: Researching Transportation and the Environment

Approximate Class Time: 2-3 periods, plus out-of-class time

Capsule Activity Description: Students research the effects of highway, road, and other transportation facility construction on the displacement of persons, businesses, and community facilities.

Goal:

To know what the effects of highway and other transportation facility construction are on the displacement of citizens and buildings.

Concepts Treated:

- Construction of highways, roads, and other transportation facilities often requires residents and businesses to relocate.
- Relocation of residents and businesses due to highway construction causes hardships for some citizens.
- There are methods, including financial compensation, for reducing the hardship on citizens and businesses forced to relocate by highway construction projects.
- Citizens need to evaluate the effects of highway construction on the displacement of citizens and businesses in determining whether a proposed transportation construction project should be undertaken.

ACTIVITY

Students study the relocation of home owners, renters, businesses, and community facilities made necessary because of highway and road construction.* The class begins by identifying major questions it would like answered, such as:

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*Students can also research examples of airports or mass transit facilities in their community (e.g., subway stations, light rail rights-of-way) that caused displacement problems.

1. How many people, if any, have changed residence in our community because of highway or road construction or expansion? How many businesses or farms have had to move? How many community facilities (e.g., schools, parks, government office buildings) have been forced to relocate?

2. Who are the people who have had to move? Are they a random distribution of the community's population or are they primarily certain segments--e.g., the poor, minorities, or the elderly? What kinds of businesses have had to move: large corporations, neighborhood stores, or both? What kinds of community facilities and nonprofit organizations have been displaced?

3. What compensation was provided to these individuals, businesses and agencies? What laws or regulations and who determined what the compensation was? How much influence did the relocatees have over what the compensation was?

4. Do the laws provide compensation for property seized by eminent domain, for searching for new property, and for purchase of new property? Is compensation provided for intangible losses stemming from relocation, such as loss of neighborhood or emotional suffering? Are the laws enforced?

5. What does the concept of "eminent domain" enable the local government to do? What power, if any, do citizens have to oppose eminent domain? What rights of appeal do citizens have?

6. What might be the effects of displacement on relocatees in terms of: the material differences between their new homes, apartments, or business facilities, and their old ones; the neighborhoods--in terms of safety, attractiveness, convenience; the psychological effects of relocating and adjusting to a different community; the geographic effects of new residences, in terms of increased or reduced commuting time, and accessibility of shopping centers, recreational facilities and friends.

7. What are the effects of displacement on businesses and farms? Do the owners tend to "set up shop" in a new community or give up the business? What tends to happen when a business or farm is relocated? Is it difficult for certain types of businesses or farms to build up a new clientele? Do some businesses fare better in the new locations?

8. What are the effects of relocation on community facilities and nonprofit organizations? Are outdated buildings modernized when they are relocated?

9. How does the government and how should the government balance the needs of transportation users with the needs of people, farms, businesses, and facilities which may require relocation when a highway or road is built or expanded?

After identifying these research areas, the class identifies methods by which to conduct the research, such as:

- Interviewing (if they can be identified--government agencies will not provide this information) residents, business owners and employees, and community agency employees who have had to relocate or are facing the prospect of relocation

- Interviewing officials in various government agencies, such as department of housing, transportation, environmental affairs, public roads, and welfare

- Interviewing relocation counselors from agencies with powers to acquire property

- Examining back issues of local newspapers

- Reading appropriate literature such as the reading provided at the end of this activity, items in the Bibliography, and other readings available from local government agencies and the U.S. Department of Transportation, Land Acquisition Division, Office of Right-of-Way, 400 7th and D Streets, Washington, D.C. 20590

- Reading sociological accounts of relocation experiences, such as Herbert Gans' *The Urban Villagers* about the relocation of Boston's West End (not, however, caused by highway expansion) or Jane Jacob's more general study, *The Death and Life of Great American Cities* (both are available in paperback)

After identifying research possibilities the class divides up the work and conducts the research. The results are analyzed and a report is prepared. You may want to provide the class with the following figures published by the U.S. Department of Transportation:

> During Fiscal Year 1973, a total of 29,260 persons, 238 farms, 2,694 businesses, and 67 nonprofit organizations were displaced. The total of all relocation payments for the year was $43,773,000. The total expenditure was broken down as follows: 37 percent for owner replacement housing, 19 percent for tenant replacement housing, 36 percent for moving payments, and 18 percent for services. In addition to relocation payments, owners also receive payments for their property based on fair market value. Of the total number of persons displaced, 24 percent were of a minority composition.
>
> For Fiscal Year 1974, a total of 24,684 persons, 208 farms, 2,625 businesses and 109 nonprofit organizations were displaced. The total of all relocation payments for the year was $47,544,880. The total expenditure was broken down as follows: 38 percent for owner replacement housing, 21 percent for tenant replacement housing, 24 percent for moving payments, and 17 percent for services. Of the total number of persons displaced, 24 percent were of a minority composition.

Evaluation Method

Students identify the effects of highway construction on the displacement of citizens and buildings by role playing situations in which a "resident" or "business owner" discusses a hypothetical construction project with a transportation agency relocation "counselors."

PEOPLE AND BUSINESSES DISPLACED FROM RIGHT-OF-WAY*

People and businesses displaced to build highways and then relocated in other areas are obviously affected, often adversely. Highway agencies take care of this problem partly by paying those affected adversely--currently about $55 million a year for the Federal portion of the payments on Federal-aid highways. About 46 percent of this is for interstate and 54 percent for other Federal-aid highway displacements. This aid takes the form of assistance in locating and moving for the 21,000 people, 2,190 businesses, 116 farmsteads, and 103 nonprofit organizations displaced in 1975.

A portion of the funds provide displaced residents with housing equal to the housing they previously occupied. The relocation housing must also be decent, safe, and sanitary, even though the people relocating may not have been in decent, safe, and sanitary housing previously. Decent, safe, and sanitary housing must be structurally sound and must have electric lights, running water, a flush toilet in a well lighted and ventilated room indoors, tub or shower, bathroom sink, kitchen sink, kitchen stove and refrigerator service, adequate heat, a safe egress, and space of 100 square feet for one person, 150 for two, 200 for three, etc.

Residents faced with higher costs for comparable housing after relocation can be paid to meet these higher costs--for example, up to $15,000 for homeowners and $4,000 for renters. Average costs were below this, about $8,500 for the 2,600 homeowners and $1,750 for 6,500 renters qualifying for additive relocation payments in 1975.

The effectiveness of these 1970 (and earlier 1968) provisions to help relocatees with higher housing costs continues to be evaluated and study findings already available from Ohio, Texas, Virginia, and Washington provide insight on this. Previous studies had shown that some improvement in housing was typical with relocation even before higher housing costs were reimbursed by government. Previous studies had also documented some serious problems for some of those displaced, especially elderly and poor people.

Businesses which are displaced by highways are also entitled to relocation compensation. If the property and facilities are owned by the businesses the business is entitled to the fair market value of any property taken for the highway. There is no provision, however, for supplemental payments to either owners or renters to cover higher facility costs as is the case with residential relocatees. Owners of the businesses are paid expenses incurred

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*Taken from *Social and Economic Effects of Highways,* U.S. Department of Transportation, Federal Highway Administration, Washington, D.C. 1976, pp. 5-6.

in searching for replacement facilities and moving to the new facilities. If a firm operating at only one location feels that it cannot relocate without a substantial loss of patronage, it may elect to cease operations and receive a payment based on its average net annual earnings in lieu of a payment for moving expenses. This cease-operations payment ranges from $2,500 to $10,000. Very little analysis of business relocation has been done to date, but findings in a Texas study indicate that locating suitable replacement facilities is often the most difficult aspect of relocation. A second finding was that small businesses which are dependent on local customers often have substantial difficulty when forced to relocate, with many going out of business.

ACTIVITY #38

Mini-unit Topic: Researching Transportation and the Environment

Approximate Class Time: 2-3 periods, plus out-of-class time

Capsule Activity Description: Students take field trips to different agencies and individuals to learn about transportation's effects on the environment.

Goal:

To know what some of the effects of transportation are on the environment.

Concepts Treated:

- Transportation has many different effects on the environment, both positive and negative.
- Various features of the environment sometimes interfere with travel safety, convenience, and enjoyment.

ACTIVITY

Students investigate three different aspects of transportation and the environment in this activity.

First, the class lists the different *sources* of transportation's *harmful* effects on the environment, such as automobiles, airplanes, boats, trucks, truck terminals, buses, and recreational vehicles. Students then identify individuals and agencies in the community who are in a position to provide information about the environmental effects of these vehicles or facilities, such as vehicle manufacturers, vehicle salespersons, automobile mechanics, transportation planners, terminal operators, and air pollution control monitors.

Students then list ways in which transportation can *benefit* the environment and identify agencies and individuals they can visit who can provide information on this aspect of the relationship between transportation and the environment. Students can consider visiting crop spraying companies, garbage truck manufacturers and companies, rain-making companies, touring agencies, departments of public works and highways, and highway, bridge, and gas station engineering and architecture companies.

Finally, students list ways in which features of the environment can affect travel safety, convenience, and enjoyment and then identify agencies and industries they can visit which will have information on how these environmental features affect travel. Sample individuals and agencies who might have such information include owners and operators of automobile junkyards and "graveyards," departments of public works and highway officials responsible for highway sign production and installation, recreational and natural wildlife authorities whose property causes a detour in highway construction, and advertising companies and business officials whose advertisements appear on highway billboards.

After identifying these three categories of individuals and agencies, students decide who they would like to visit and break into small groups formed around each agency or individual that will be visited. Each group then develops a list of questions it would like answered by the official(s) or agency it plans to visit.

1. What effects on the environment did this facility, object or mechanism (for example, automobile exhaust system, billboards) formerly produce that they no longer produce?

2. How were these effects reduced or eliminated?

3. Did their elimination or reduction involve the loss of any jobs? If so, what happened to those people who lost their jobs? Did the effort involve the creation of any new jobs?

4. Do certain facilities, mechanisms, or objects (for example, airplanes, tall trees) have any adverse effects on the environment? If so, what effects ?

5. What, if anything, is being done now to reduce or eliminate harmful effects transportation may be having on the environment?

6. What are the obstacles which prevent or make it difficult to reduce these harmful effects? Would any jobs be lost or created if these effects were reduced? How many?

7. What is the government doing, if anything, to reduce or eliminate these effects? What laws are designed to assist in this process? How effective are they? Are they being enforced?

8. What is being done to help workers who may lose their jobs as a result of these efforts?

9. What can private citizens do to reduce these effects?

During their visits, groups take notes and collect agency or company literature if available. After the visits, groups meet to discuss:

1. What new information they learned about transportation's effects on the environment or the effects of features of the environment on travel safety, convenience, or enjoyment

2. Whether they think the individuals or agencies they visited seem to be doing all they can to reduce the harmful effects of transportation on the environment, and to alter or eliminate features of the environment which interfere with travel; and if not, why not

The groups conclude the activity by preparing and presenting reports of their findings to the class and responding to comments and questions from other groups and you.

Evaluation Method:

Students describe the effects of transportation on the environment in role-played dialogues between an "official" of an agency they visited and a "visitor" to that agency inquiring about transportation's effects on the environment.

ACTIVITY #39

Mini-unit Topic: Researching Transportation and the Environment

Approximate Class Time: 2-4 periods, plus out-of-class time

Capsule Activity Description: Students poll the public on their knowledge about and attitudes toward conflicts between transportation and the environment.

Goal:

To know what the public's attitudes are toward conflicts between transportation and the environment.

Concepts Treated:

- The extent to which conflicts between transportation and the environment can be resolved depends to a large extent on public awareness of the conflicts and willingness to help resolve them.
- Citizens need to know the public's attitudes toward conflicts between transportation and the environment in order to promote resolutions which will meet with public support.

ACTIVITY

A small group of students develops a list of questions to ask the public about transportation's effects on the environment, about the effects of various features of the environment on travel safety, convenience, and pleasure, and about its attitudes toward resolving conflicts between transportation and the environment. Before developing its questions, the group decides whom to poll--for example, other students, faculty, residents of the community, or people in specific agencies or companies. The group then develops its questions, using, if it wishes to, the sample questions (Survey A) provided at the end of this activity. The group submits its questionnaire to the rest of the class as a "dry run" to identify ambiguous or confusing questions.

The group revises its questionnaire based on the results of the "dry run" and then decides how many respondents to poll and how to contact them (for example, door-to-door or on the street?). The group divides responsibility for asking the questions (for example, students can conduct the poll individually or in groups of two) and conducts the poll.

After conducting the poll, the group tabulates its findings and records the answers to the following questions:

1. What information does the public have about conflicts between transportation and the environment? What information does it lack?

2. What are the public's attitudes toward resolving these conflicts?

3. What are the implications of this knowledge and these attitudes for the success of government programs and citizen action to resolve conflicts between transportation and the environment?

After completing its study, the group reports its findings to the other students in the class and responds to comments and questions.

Evaluation Method:

Students identify the public's attitudes toward conflicts between transportation and the environment in role-played dialogues of a "television interviewer" questioning a "person-in-the-street" regarding his or her views on this issue.

Variation and Supplementary Activity:

Students can poll citizens on how they feel transportation's harmful and beneficial effects involve them personally. A sample questionnaire (Survey B) is provided at the end of the activity.

SURVEY A

Sample poll questions on the public's general knowledge of and attitudes about conflicts between transportation and the environment

Sex: M F

Age: under 14 14-17 18-21 22-29 30-49 49-59 over 59

Do you own a:

Car

Truck

Recreational vehicle (boat, snowmobile, etc.)

(Check all that apply)

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1. In general, what kind of effects do you feel transportation--cars, planes, boats, highways, etc.--have on the environment? (Circle one.)

   all good mostly good some good, some bad mostly bad all bad

2. In what ways, if any, do you feel transportation has *harmful* effects on the environment? (Check any of the following which interviewees mention.)

   ☐ Air

   ☐ Water

   ☐ Use of land

   ☐ Use of energy resources

   ☐ Noise

   ☐ Things we see, look at

   ☐ People moving to different parts of town or state

   ☐ Other (write in): _____

3. In what ways, if any, do you feel using transportation vehicles can have *beneficial* effects on the environment? (Check any of the following which interviewees mention.)

   ☐ City highways relieving city traffic congestion

   ☐ Highways in cities reducing stop-and-go (highly polluting) traffic

- [ ] Pollution monitoring
- [ ] Fighting forest fires
- [ ] Insect control
- [ ] Forest seeding and fertilizing
- [ ] Airlifting food to stranded livestock
- [ ] Garbage collection
- [ ] Enabling people to view scenery and visit parks
- [ ] Crop spraying
- [ ] Weather control
- [ ] Other (write in): _____

4. Do you feel there is anything you as a private citizen can do to help reduce transportation's harmful effects on the environment? (Circle one.)

   Yes No

5. Under what circumstances would you use a car less? (Check one or more.)

   - [ ] If a carpool to work were available
   - [ ] If there were more public transportation
   - [ ] If there were cheaper public transportation
   - [ ] If there were safer public transportation
   - [ ] If highways provided express lanes for buses or carpools
   - [ ] If gasoline cost a lot more
   - [ ] If I had to pay $5.00 a day to park my car at work
   - [ ] Other (fill in): _____

6. Do you feel there is anything the government can do to help reduce transportation's harmful effects on the environment? (Circle one.)

   Yes No

7. If the government placed some restrictions on when or how often you could travel--for example, banned Sunday driving--, would you feel: (Check one.)

   - [ ] Pleased the government took action

☐ Somewhat annoyed

☐ Very angry

☐ Indifferent

8. Do you have any other comments on transportation's effects on the environment?

_____

_____

_____

_____

_____

SURVEY B

Sample poll questions on how conflicts between transportation and the environment directly affect the public

Do you live or near: (Check all that apply.)

☐ A busy street or highway

☐ An airport

☐ A river or lake

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1. Are you bothered by automobile exhaust fumes? (Check one.)

   ☐ Not at all ☐ Some ☐ A lot

2. If you are bothered by automobile exhaust fumes, why? (Check all that apply.)

   ☐ They're just unpleasant for me

   ☐ They make my eyes water

   ☐ They make me nauseous

   ☐ They give me headaches

   ☐ I feel they are unhealthy for me

   ☐ They harm my plants and shrubbery

   ☐ They are killing animals in the zoo

   ☐ They bother my pets or livestock

   ☐ They dirty my clothing

   ☐ Other (specify): _____

3. Are you bothered by airplane, car, or truck noise? (Check one.)

   ☐ Not at all ☐ Some ☐ A lot

4. If you are bothered some or a lot by airplane, car, or truck noise, why? (Check all that apply.)

   ☐ It's just unpleasant for me

   ☐ It hurts my ears

☐ It may damage my house

☐ It disturbs my sleep

☐ It seems to be making me hard of hearing

☐ It makes conversation difficult

☐ It makes it difficult to concentrate

☐ Other (specify): _____

5. Do any features of the environment interfere in any way with your travel safety, comfort, or enjoyment--for example, do billboards or street litter bother you or does a detour around a park or wildlife reservation bother you? (Check one.)

☐ Not at all ☐ Some ☐ A lot

6. Does transportation have any positive effects on the environment which benefit you personally? (Check all that apply.)

☐ Forest fire fighting

☐ Crop spraying

☐ Insect control

☐ Garbage collection

☐ Airlifting food to stranded livestock

☐ Touring scenic places

☐ Forest seeding

☐ Rain making

☐ Monitoring pollution

☐ Highways drawing off traffic from the city

7. Do you hold a job which might be lost if some of transportation's harmful effects on the environment were eliminated?

Yes No

8. Do you have any other comments on how transportation's effects on the environment involve you personally?

_____

_____

ACTIVITY #40

Mini-unit Topic: Researching Transportation and the Environment

Approximate Class Time: 1½-3 periods, plus out-of-class time

Capsule Activity Description: Students research the politics involved in citizen participation designed to balance the needs of transportation and the environment.

Goal:

To be aware of the political constraints which hamper citizen efforts to balance transportation and the environment.

Concepts Treated:

- There are many political considerations which can make it difficult or impossible for citizens to effectively balance the needs of transportation and the environment.
- There are often effective methods by which citizens can overcome the political constraints which serve to keep transportation and the environment in a state of imbalance.
- Citizens need to identify methods by which they can overcome the political constraints which serve to keep transportation and the environment imbalanced.

ACTIVITY

Students research the constraints operating against citizen action designed to reduce transportation's harmful effects on the environment and the environment's adverse effects on transportation; and methods of attempting to overcome those constraints. The class researches three aspects of this issue:

1. *What obstacles* make it difficult for citizens to take action to reduce harmful effects?
2. *Who* can be influenced most easily and effectively by citizens to reduce these adverse effects?
3. *How* can these individuals or groups be influenced?

Break the class into small groups and have each group select a different case study--either a live issue in your community or one that has been reported elsewhere (as in *Rites of Way*, Bibliography entry #40). The groups decide what research methods to use, for example: reading available literature, interviewing appropriate officials, and engaging in volunteer work. The groups divide responsibility for the research and carry it out.

After completing their research, the groups compare findings and present reports to the class. You can fill in any data or considerations not discussed by students. Possible obstacles include groups or individuals with vested interests against reducing harmful effects:

- Spending priorities that result in lack of public funds for expensive but needed facilities such as public transportation
- Lack of political and financial accountability by autonomous transit authorities, port authorities, etc.
- Lack of awareness and unconcern--as well as disclaimers of responsibility by government agencies and businesses for the harmful environmental side-effects of their policies
- Buck-passing--claiming it is some other agency's or business' responsibility to police or clean up the environment
- Claims by business and government that additional research is needed to verify the "alleged" dangers to the environment or to travel--placing the burden of proof on the environmental protection advocate or the automobile driver
- Industries and businesses that have powerful lobbies at all government levels and for whom action would cost money
- The press and media, some of whom are dependent on advertising by businesses to survive
- Politicians who are reluctant to jeopardize campaign contributions from businesses or who have business interests of their own
- Lack of coordination among various government agencies and private businesses who could be involved in a unified program to reduce transportation's harmful effects
- Logrolling among legislators: willingness to vote for other legislators' bills in expectation of future reciprocal consideration

Other obstacles are created by the human factors that discourage citizens from taking action:

- Not wanting to lose benefits transportation confers
- Laziness

- Ignorance about the seriousness of transportation's harmful effects on the environment or the environment's adverse effects on transportation, and of action they can take to reduce those effects

- Fear of reprisal

- Indifference

- Lack of time

- Fatalism or cynicism--belief that no action they can take will improve the situation

- Selfishness

In terms of both equipment and labor, public transportation is often expensive to initiate and operate. Other budget items (for example, schools, fire protection, law enforcement) are often considered to have higher priority for funds.

Who can be influenced through citizen participation? Target groups among the government, business, and educational community include some regulatory agencies; some politicians, especially at election time; state government which will often act before the Federal--e.g., anti-noise pollution laws (New York and California), and auto emission control law (California). Seek out the most responsive *level* of government. Citizens and citizen groups likely to take action are those whose personal interests are at stake--e.g., residents whose property may be seized by airport expansion and those who have a sense of community responsibility.

These groups and citizens can be influenced through such target areas among the government, business, and educational community as:

- Citizen participation in public hearings held by the local transit authority or transportation planning agency.*

- Citizen participation in local or state citizen advisory committees.

- Petitions and letter-writing campaigns may be effective with some political leaders, especially during election years and when key bills are in committee or up for vote.

- Boycotts of products may be successful with some businesses.

- Rallies or picketing at key times and places to publicize the issues may make authorities take notice, and bring pressure to bear on targeted individuals, agencies, or businesses.

- Civil action in the courts.

- Introduction into legislatures, town councils, etc. of aggressive legislation. The mere proposal of legislation may bring results.

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*See Bibliography entries #47-49 which discuss Federal regulations regarding citizen participation.

Citizens and citizen groups can hold peaceful rallies that impart excitement, a feeling of participation, and the hope of success to a line of action; and enlist new volunteers and conduct educational campaigns via fact sheets, newspaper advertisements, and lectures. The groups should be aware of the need for specialists, especially lawyers and planners, who have the time and energy to devote considerable attention to the campaign. Your group may consider the formation of coalitions among citizen groups for more power.

Evaluation Method:

Students describe the constraints which may make it difficult for the public to engage in citizen participation designed to resolve conflicts between transportation and the environment. Students then suggest how these constraints can be overcome.

ASSESSMENT ACTIVITIES

The four activities that follow are designed for use as evaluation tools before and after you use one or more of the preceding mini-units or activities.

The first activity enables you to assess before using one or more units what topics and issues related to transportation and the environment your students are interested in studying. The information you glean from the activity will help guide your selection of mini-units and activities to use.

The second activity is a course assessment exercise which will enable you to learn what your students liked and didn't like about the mini-units or activities you have used.

The third activity contains questions designed to reveal student attitudes toward various issues related to transportation and the environment.

The final activity consists of a series of essay, multiple-choice and true-or-false questions you can ask your students in order to evaluate how much they learned from the mini-units or activities. You can also administer the questions before you teach about transportation and the environment as well as afterwards, and compare results. In any case, use only those questions which treat topics your students will be studying or have studied.

ASSESSMENT ACTIVITIES

Activity #	*Activities*	*Class Time*
41	DESCRIPTION: You and your students evaluate class interests in studying transportation and the environment.	½-1 period
42	DESCRIPTION: The students evaluate the course.	½-1 period
43	DESCRIPTION: You and your students evaluate student attitudes toward issues related to transportation and the environment.	½-½ period
44	DESCRIPTION: The students respond to questions about issues related to transportation and the environment.	½-1 period

ACTIVITY #41

Supplementary Activity

Approximate Class Time: ½-1 period

Capsule Activity Description: You and your students evaluate class interests in studying transportation and the environment.

ACTIVITY

Students answer questions designed to reveal their interests in transportation and the environment. Sample questions are provided on the following pages.

The interest questionnaire should be answered anonymously to allow students to feel free to express their feelings. Tell the class that there are no right and wrong answers to the questions; they are simply designed to help you identify what aspects of transportation and the environment the students should study.

STUDENT INTEREST QUESTIONNAIRE

Do you have problems with any of the following transportation effects on the environment? Such problems might affect your health, your plants, your opportunities for recreation, and so on. (Check all that apply.)

Transportation Effect	*No Problems*	*Some Problems*	*Many Problems*
Air pollution from trucks			
Air pollution from cars			
Noise pollution from cars			
Noise pollution from trucks			
Noise pollution from airplanes			
Noise or air pollution from trains			
Noise pollution from recreational vehicles (snowmobiles, etc.)			
Water pollution from boats			
Dirt pollution from cars or trucks			
Dirt pollution from planes			
Unpleasant sights created by transportation facilities			
Litter, loud muffler noises, and other annoying or harmful effects of transportation that result *from the way people use* cars, boats, etc., rather than from the vehicles themselves.			

Do you have problems with any of the following features of the environment which may affect travel? (Check all that apply.)

Environmental Feature	*No Problems*	*Some Problems*	*Many Problems*
Litter			
Commercial signs			
Confusing directional signs			
Automobile graveyards			
Poor visibility due to trees, hills, etc.			
Railroad crossing hazards			
Animals			

How much do transportation vehicles (e.g., cars) or facilities (e.g., gas stations) affect you in the following ways? (Check all that apply.)

Type of Effect	*Not at All*	*Some*	*A Lot*
Your health			
Your concentration			
Your hearing			
Keeping things clean			
Using up land you would like used for something else, like a park			
Your plants, trees, livestock, etc.			
The amount of gasoline available for driving			

The best way to solve these problems is (check all that apply):

- ☐ None of them can be solved
- ☐ By getting honest politicans
- ☐ By educating the public
- ☐ By passing laws to correct abuses
- ☐ By letting everyone solve his own problems
- ☐ By citizens protesting
- ☐ Through citizen involvement in transportation planning
- ☐ Other (specify): _____

_____

_____

_____

_____

_____

_____

A course on transportation and the environment could help me most if it dealt with the following specific transportation and environmental topics (specify):

_____

_____

_____

_____

_____

_____

_____

A course on transportation and the environment could help me most if it let me study what I want, but assisted me to do so effectively by (specify):

_____

_____

_____

_____

_____

_____

A course on transportation and the environment could help me most if it used the following learning methods (check all that apply):

- ☐ Art
- ☐ Audiovisual
- ☐ Debates
- ☐ Discussions
  - ☐ Small group
  - ☐ Class
- ☐ Drama
  - ☐ Role plays
  - ☐ Games
- ☐ Field trips
- ☐ Independent study
- ☐ Interviews
- ☐ Lectures
- ☐ Polls
- ☐ Reading
- ☐ Research
- ☐ Teaching peers
- ☐ Volunteer work
- ☐ Writing

ACTIVITY #42

Supplementary Activity

Approximate Class Time: ½-1 period

Capsule Activity Description: Students evaluate the course.

ACTIVITY

Students write responses to questions designed to help reveal to them and to you whether the course objectives were achieved and, insofar as they were not, how they can be achieved in the future.

Sample questions appear on the following page. After answering questions, students can discuss in small groups or as a class the value of the course and how to improve it based on the students' written responses.

COURSE EVALUATION QUESTIONS FOR STUDENTS

1. What did you gain from this course? Check as many or few of the following as apply:

- ☐ Only a review of well-known facts
- ☐ A few new useful facts
- ☐ Much new useful information
- ☐ Better understanding of _____(Fill in what the course covered)
- ☐ Desire to go more deeply into study of _____(Fill in topics covered)
- ☐ Some new and important attitudes toward _____(Fill in topics covered)
- ☐ Changes in my personal travel behavior or my reactions to other people's travel behavior
- ☐ Other (Explain briefly)

2. From which part of the study do you feel you learned well?

- ☐ Preparation of homework assignments
- ☐ Individual reading
- ☐ Oral reports
- ☐ Written reports
- ☐ Lectures
- ☐ Role plays
- ☐ Games
- ☐ Individual projects
- ☐ Guest speakers
- ☐ Debates
- ☐ Small group discussions
- ☐ Class discussions

☐ Field trips

☐ Audiovisual aids

☐ Other activities (List them)

3. What is your opinion concerning the amount of time spent in this study?

☐ Too much ☐ Too little ☐ About right

4. Which audiovisual aids were of most value?

5. From which books and pamphlets did you learn the most?

6. From which games did you learn the most?

7. From which role plays did you learn the most?

8. What questions or topics had you hoped would be included in the study but were not?

9. What suggestions do you have for improving the course?

10. Do you feel that there was unnecessary repetition in material covered in this class and material covered in another class or classes? If so, what materials?

11. What do you think are the greatest needs in educating citizens about transportation and the environment?

12. After having considered very carefully what you have learned during this course, have you changed your mind concerning your personal use of transportation vehicles and facilities? If so, how?

13. Have you developed any interest in taking part in citizen participation activities to resolve conflicts between transporation and the environment?

ACTIVITY #43

Supplementary Activity

Approximate Class Time: ½-½ period

Capsule Activity Description: You and your students evaluate student attitudes toward issues related to transportation and the environment.

ACTIVITY

Students answer questions designed to indicate their attitudes toward issues related to transportation and the environment. Sample questions--from which you can select those you find useful--are provided on the following pages.

By having students answer the questions before and after the course, you can learn whether what they studied changed their attitudes. Or you can administer the questions before the course just to determine what direction you feel your unit should take, i.e., which student attitudes most need to be addressed.

The questions should be answered anonymously to allow students to feel free to express their feelings. Answers may reflect a variety of factors, including ignorance, indifference, reasoned thought, traumatic personal experiences, and parroting the acceptable answer.

Check the appropriate column that indicates most accurately your feelings about the question.

Questions	*Agree Strongly*	*Agree*	*No Opinion*	*Disagree*	*Disagree Strongly*
Generally speaking, transportation has no serious harmful effects on the environment.					
Only automobiles have important transportation effects on the environment.					
Nobody really knows how much automobiles, planes, etc., damage the environment.					
Transportation has very little to do with the energy shortage in this country.					
Transportation (cars, planes, etc.) has a lot to do with how our land gets used.					
Noises made by planes, cars, etc., disturb a lot of people quite seriously.					
Highways enable the public to take advantage of the beauty of the natural environment.					
Airplanes can protect as well as harm the environment.					
Features of the environment never interfere with travel safety or enjoyment.					
Nothing much that individual citizens can do in their private lives will help reduce the harmful effects cars, planes, etc., have on the environment.					
There are some things I could personally do that would help reduce the harmful effects our cars, planes, etc., have on the environment.					

Questions	*Agree Strongly*	*Agree*	*No Opinion*	*Disagree*	*Disagree Strongly*
The government has no right to ask us to change our daily routine to help reduce the effects cars, planes, etc., have on the environment.					
Most Americans are too attached to their cars to agree of their own free will to use them less or use them more efficiently.					
If citizens knew more about how their use of cars, planes, etc. damages the environment, they would not use them so much.					
If a private citizen is personally bothered by a neighbor's or friend's use of a car, snowmobile, etc., he or she should consider trying to get that person to stop doing it or work with the person to find a compromise.					
If a private citizen is annoyed that a friend, neighbor, etc. is doing something with his car, snowmobile, etc., that harms the environment, even though it doesn't bother him or her *personally*, he or she should consider trying to get that person to stop doing it or work with the person to find a compromise.					
There's nothing that private citizens can do to persuade other private citizens, like neighbors, friends, family members, and fellow workers to take actions that will reduce the harmful effects of cars, planes, etc., on the environment.					
There are times when we should consider objecting to other citizens' actions regarding the environment which interfere with travel safety or convenience.					

Questions	*Agree Strongly*	*Agree*	*No Opinion*	*Disagree*	*Disagree Strongly*
Whenever there is a choice between protecting the environment or getting more fuel, we should protect the environment.					
There's nothing we, as ordinary citizens, can do in the way of political action to reduce the harmful effects cars, planes, etc., have on the environment.					
Citizens should never engage in activist methods to reduce the harmful effects of cars, planes, etc., on the environment--methods like boycotts, pickets, or public demonstrations.					
Citizen participation in transportation planning is encouraged by the Federal government.					
If people knew more about *how to take part in* social or political actions to reduce the harmful effects cars, planes, etc., have on the environment, they would engage in such activities.					
If people had more courage, they would get more involved in social and political action to prevent transportation from damaging the environment.					
There are just too many obstacles for ordinary citizens to get involved with political or social action to reduce the harmful effects cars, planes, etc., have on the environment.					
It is useful to write letters to politicians and other officials protesting or supporting their policies on transportation.					
Citizens should consider what benefits transportation provides society before taking action to reduce its harmful effects on the environment.					

ACTIVITY #44

Supplementary Activity

Approximate Class Time: ½-1 period

Capsule Activity Description: Students respond to questions about issues related to transportation and the environment.

ACTIVITY

Students answer questions about issues related to transportation and the environment. Sample questions--from which you can select those which are useful--are provided on the following pages. The questions are divided into three topic areas:

1. The effects of transportation on the environment and ways in which features of the environment may interfere with travel safety, convenience, or enjoyment

2. Personal travel alternatives which will help reduce transportation's harmful effects on the environment

3. Citizen participation to reduce transportation's harmful effects on the environment

Sample questions on transportation's environmental effects. Correct answers to true-or-false and multiple choice questions are in italics. Use those questions that relate to activities your students have studied.

Essay Questions

1. There are several major ways in which transportation can affect the environment. What are they? Which are beneficial and which harmful?

2. When we think of the automobile's effects on the environment, we immediately think of air pollution. However, many things are built and used to enable people to use cars--for example, gas stations. What other examples can you think of things that are built so that people can drive cars? How do these other things affect the environment?

3. Transportation affects the environment in terms of things we have to *look at* that service cars, airplanes, etc. What are some of these things we *see* in everyday life that have been built because of cars, trucks, etc.? Do you find any of these things pleasant or unpleasant to look at? Why?

4. What are the major transportation polluters? How do they pollute the environment?

5. What are some of the beneficial effects transportation has on the environment? Whom do they benefit and how?

6. Often, we think of the automobile as polluting the environment. In what ways can highways and automobiles help preserve the environment and enable us to enjoy our natural surroundings?

7. Is noise pollution caused by automobiles, trucks, and airplanes a minor nuisance or is it something serious? How do you know?

8. Some people are more easily bothered by noise than are others. Describe some of the psychological effects that airplane and truck noise may have on such people.

9. Does transportation have different environmental effects in rural areas than in urban areas? If so, what are the differences?

10. In what respects can features of the environment create obstacles to travel safety, convenience, or enjoyment?

11. Give three examples of actions taken by the Federal government to protect the environment from harmful effects of transportation.

12. Give one example of how the Federal government provides for citizen participation in transportation planning.

Multiple-Choice Questions (Answers in italic reflect 1974 data.)

1. Transportation's harmful effects on the environment include all of the following except:

   (a) *Garbage collection*
   (b) Population movement
   (c) Air and noise pollution
   (d) Land use
   (e) Energy consumption

2. Noise pollution from cars, planes, and trucks directly relate to all of the following except:

   (a) *Automobile insurance*
   (b) Transportation planning
   (c) Recreational vehicles
   (d) Urban transportation problems

3. The average commuter in the United States spends how many minutes or hours a working day traveling to *and* from work?

   (a) 5 minutes
   (b) *20 minutes*
   (c) 1 hour
   (d) 3 hours
   (e) 5 hours

4. What percentage of the land in the average city is used up by roads and highways?

   (a) 1 percent
   (b) 15 percent
   (c) *35 percent*
   (d) 75 percent

5. What percentage of the land in the average city is used up by businesses which service automobiles?

   (a) 1 percent
   (b) 15 percent
   (c) *35 percent*
   (d) 75 percent

6. Most people think of car exhausts when they think of automobile pollution. Which of the following automobile parts also affect the environment?

   (a) Fan belts
   (b) Brakes
   (c) Tires
   (d) All of the above
   (e) (a) and (b)
   (f) *(b) and (c)*

7. Ground brake linings and clutch facings in cars pollute the air with a potentially dangerous substance called

(a) Carbon monoxide
(b) *Asbestos*
(c) Kryptonite
(d) Sulphuric acid

8. Many recreational vehicles, especially boats, trailbikes, and snowmobiles, can affect the environment because they

(a) Consume gasoline
(b) Cause population shifts
(c) Create unattractive vistas
(d) Make loud noises which bother animals and people
(e) (a), (b), and (d)
(f) (a) and (b)
(g) *(a) and (d)*

9. How much of the air pollution in the average city was caused by automobiles as of 1974?

(a) 5 percent
(b) 30 percent
(c) 60 percent
(d) 85 percent

10. Automobile pollution in the air is proven or suspected as causing all of the following except

(a) *Pneumonia*
(b) Emphysema
(c) Cancer
(d) Birth defects
(e) Bronchitis

11. Automobile exhaust can have bad effects on all of the following except

(a) Clothing
(b) Livestock
(c) Monuments and public buildings
(d) Plants
(e) *Telephone poles*

12. Beside being annoying, noise pollution from cars and planes can affect all of the following except

(a) Hearing
(b) Sleep
(c) Concentration
(d) *Sight*

13. Transportation's beneficial effects on the environment

(a) Are nonexistent
(b) *Must be weighed against its harmful effects in deciding what action to take*
(c) Always outweigh its harmful effects
(d) Benefit only automobile drivers

14. Airplanes provide all the following beneficial effects on the environment except

(a) Fighting forest fires
(b) *Cleaning livestock*
(c) Spraying and killing unwanted insects
(d) Helping to control the weather

15. Highways benefit the environment in all of the following ways except

(a) Enabling people to view scenery
(b) Reducing stop-and-go traffic
(c) Enabling people to hike and camp out
(d) *Preventing the land from eroding*

16. Features of the environment can interfere with travel in which of the following ways:

(a) Transportation safety
(b) Speed
(c) Enjoyment
(d) Expense
(e) *All of the above*

Matching Questions

1. Match the *agents* of transportation pollution with the vehicles that *cause* them. Pick from the list of agents below and write each one that applies next to the vehicles that follow.

Carbon monoxide, nitrogen oxides, and hydrocarbons
Dirt particles
Oil and gasoline spillage
Noise
Litter
Billboards
Asbestos particles

List of vehicles that cause pollution. (Write in the agents of pollution caused by each vehicle after each vehicle listed.)

Cars:

Airplanes:

Trucks:

Boats:

2. Match the vehicles and transportation-related facilities that help preserve the natural environment or increase our ability to enjoy it with the ways in which the vehicles and facilities serve these beneficial purposes. Pick from the list of ways below and write each one that applies next to the list of environmental features that follows.

Spraying crops
Viewing scenery
Reducing stop-and-go traffic
Controlling the weather
Collecting garbage
Seeding forests
Monitoring pollution
Camping and hiking
Fighting forest fires
Providing access to parks

List of vehicles and transportation facilities. (Write in the environmentally beneficial activity listed above after each vehicle responsible for each activity.)

Boats:

Airplanes:

Highways:

Trucks:

Cars:

3. Match the features of our environment with ways in which they can interfere with travel. Pick from the list of harmful effects below and write each one that applies next to the list of environmental features that follows.

Danger
Inconvenience
Ugliness
Difficulty seeing clearly
Distraction
Delay

List of environmental features. (Write in the ways in which these features can interfere with travel.)

Billboards:

Trees:

Scenery:

Junkyards (automobile graveyards):

Litter:

True or False Questions

1.	Cars are the only means of travel that cause pollution.	True	*False*
2.	Airplanes don't cause pollution.	True	*False*
3.	Loud noises aren't really a form of pollution.	True	*False*
4.	A lot of things are built to take care of cars. These things take up a lot of land in the community.	*True*	False
5.	Airplanes are used in many ways to solve environmental problems.	*True*	False
6.	Most people get to work and home by car.	*True*	False
7.	Cars are using up a lot of our energy--gasoline, for example.	*True*	False
8.	Fun vehicles like snowmobiles and motorcycles cause pollution.	*True*	False
9.	Automobile pollution is unpleasant, but it doesn't really hurt anyone seriously.	True	*False*
10.	Loud noises are awful to hear but they aren't dangerous.	True	*False*
11.	Cars and trucks do nothing good for the environment.	True	*False*
12.	Some people have trouble sleeping or hearing television because of loud noises from airplanes and cars.	*True*	False
13.	Airplanes leave dirt on the houses and clothing near airports.	*True*	False
14.	Because of cars, we sometimes see ugly scenes like automobile junkyards and litter.	*True*	False

15. Without cars and boats we would have more difficulty seeing pretty scenery. *True* False

16. We can see all the air pollution that's really serious. True *False*

17. Without highways people couldn't go hiking and camping as easily. *True* False

Sample questions on personal travel alternatives are given below. Answers to true or false questions are given in italics.

Essay Questions

1. If your older brother or sister were driving a car without a muffler and making a racket, would you tell him or her to get the muffler fixed? Why or why not?

2. If your father or mother drove to work every day when they could easily take the bus or subway and save gasoline, would you tell him or her to take the bus? Why or why not?

3. If you owned a car and drove to work every day, would you consider taking the bus or subway instead? What if you had to walk five blocks to get the bus? Why or why not?

4. Why do some people not like to take the bus or subway? Do you think these are good reasons?

5. Cars cause a lot of pollution. What things could people do that would limit pollution caused by cars?

6. What are carpools? How could they help the pollution problem? How could they help the energy problem?

7. How would people save gasoline in their everyday driving behavior?

8. Why do people use their cars so much? Do you think these are good reasons for using cars? Why or why not?

9. Often a private citizen has the choice of trying to stop or alter a transportation effect harmful to the environment or a feature of the environment that bothers him, or of trying to avoid it. Give an example of a situation in which a citizen has such a choice and indicate whether he should attempt to change the effect or feature, or leave the effect or feature unchanged and simply avoid it.

10. There are many reasons why people will not take personal actions to reduce transportation's harmful environmental effects or alter or

remove features of the environment which interfere with travel. What are some of these reasons and what, if anything, can be done to encourage people to overcome them?

11. There are many ways in which individuals can change their travel habits to reduce transportation's harmful effects on the environment. Mention three and indicate how these actions might reduce transportation's harmful environmental effects.

12. Have you made any changes in the way you travel or deal with the environment as a result of this course that will reduce transportation's harmful effects on the environment or alter a feature of the environment which hampers travel? If so, what changes have you made and how will they help? If not, why not?

True or False Questions

1.	Everyone already knows how cars, airplanes, etc. cause pollution.	True	*False*
2.	The only reason people don't make cars that don't pollute is that we don't know how to do it.	True	*False*
3.	Cars that don't pollute generally don't work quite as efficiently as other cars.	*True*	False
4.	Some people don't get together to do something about pollution from cars, planes, etc. because they think common action won't do any good.	*True*	False
5.	Companies can sometimes do things or make suggestions to their workers that might help reduce pollution from cars, planes, etc.	*True*	False
6.	Before trying to do something about pollution from cars, planes, etc., people should try to decide whether what they want to do will hurt other people.	*True*	False
7.	Before taking action to reduce pollution caused by cars, planes, etc., people should consider first what good things cars, planes, etc. do for society.	*True*	False

Sample questions on citizen participation in which citizens can become involved to reduce transportation's harmful effects on the environment and alter or eliminate features of the environment which interfere with travel.

Essay Questions

1. There are many political and social actions citizens can take to reduce transportation's harmful effects on the environment and hindrances to travel caused by features of the environment. Describe one such action and

   a. Indicate the positive benefits the transportation source (or feature of the environment) provides society
   b. Justify the action in the face of these benefits
   c. Indicate whether the action would be effective and why
   d. Outline exactly how it should be carried out
   e. Indicate whether the method would be morally defensible, and why

   In order to do this, you will need to identify a particular transportation effect harmful to the environment or an obstacle to travel that your method might be suited for remedying.

2. Are there social and political actions that young people can take to reduce transportation's harmful effects on the environment and obstacles to travel caused by features of the environment? If so, name one you could get involved in and what specific things you could do that would help. If not, explain.

3. Citizen participation in transportation planning is now a national policy. If there were a transportation planning effort going on in your community, how would you find out about it? How would you get involved?

4. There are often obstacles that make it difficult for the average citizen to get involved in social or political action to reduce transportation's harmful effects on the environment. Mention five of these obstacles and discuss whether and how they could be overcome.

5. Some people feel that if citizens were better informed about transportation's harmful effects on the environment, they would take more actions to reduce those effects.

   a. Do you agree that education would help? Why?
   b. If you feel it would,
      (i) Who should do the educating? and why?
      (ii) What should the public be "taught" or informed about?

6. If you wanted to write letters to powerful people who could help reduce transportation's harmful effects on the environment, whom could you write to? Why to them?

7. The government has taken actions to help reduce transportation's harmful effects on the environment. What are the important actions it has taken? Have these actions been effective? Are there other actions it could take? How does it enforce its actions?

8. What kinds of court actions are available to citizens who feel that their transportation concerns have not been adequately considered by public authorities? What are the advantages and disadvantages of court action, from the viewpoint of the private citizen?

9. Do you have a role as a citizen in controlling automobile pollution?

10. What is the major purpose of the National Environmental Policy Act of 1969? In your opinion, is this purpose being achieved? Why or why not?

11. What is the action plan? How do you think it has affected highway planning in your state?

12. What constraints make it difficult to reduce some of transportation's harmful effects on the environment? Can anything be done to overcome these constraints?

13. What beneficial effects of transportation must be taken into consideration before deciding whether a harmful effect on the environment should be reduced or eliminated?

READINGS ON TRANSPORTATION AND THE ENVIRONMENT

ENVIRONMENTAL AND HEALTH EFFECTS OF AIR POLLUTION*

The effects of air pollution vary with time and place and person, but few of us can escape these effects altogether. Air pollution can impair health. Dirty air makes eyes water and smart; it stings the throat and upsets breathing. People with chronic lung or heart disease are particularly vulnerable to air pollution. Epidemiological studies indicate that direct relationships exist between prolonged exposure to polluted air and the incidence of emphysema, bronchitis, asthma and lung cancer. Polluted air, sustained and heavy for several days, has caused serious illness and death--especially among infants, the elderly, and people with weakened hearts or lungs.

More obviously, air pollution reduces visibility. It can spoil scenic vistas. It can ground planes and make driving hazardous. Its corrosive qualities cause vast economic losses and contribute to the deterioration of cities. It rots and soils clothes, discolors house paints, and rusts metals. It marks monuments and public buildings and increases housekeeping chores and costs for families and businesses.

Damage from air pollution affects rural areas too. It injures vegetation, stunts the growth of shrubs and flowers, damages crops and trees and causes illness among livestock. To farmers, these costs are direct; to most of us, they come indirectly in the form of higher food bills.

Air pollution threatens the delicate, complex natural systems on which all life depends. Undesirable ecological changes may well be its most dangerous long-range result. Signs of climatic alternations are already appearing, at least on a small scale. In 1969 we poured 281 million tons of pollutants into the air in the United States alone, ignoring the dangers that we might be degrading our environment beyond repair.

Automobile Emissions and Their Control

The automobile is one of the nation's major environmental polluters. By weight, more than half of all of the nation's man-made air pollution can be attributed to the internal combustion engine. In some urban areas, it reaches 85 percent of the total quantity of air pollution. Its exhausts include carbon monoxide, hydrocarbons and nitrogen oxides. The automobile also emits varying amounts of lead abestos and other pollutants, many of which end up in the lungs.

Efforts to reduce the level of auto emissions in this country are proceeding along three fronts. Individuals are being encouraged by public interest organizations to increase their use of less polluting modes of travel--car pools, bicycles, walking, and public transportation--and to maintain their automobiles in optimum emission-reducing condition. At the same time, Congress recognized, in passing the 1970 Clean Air Amendments, that the real problem rests with the internal combustion engine itself. Finally, the various states having major air pollution problems have undertaken a program of controlling emissions from already existing vehicles.

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*This reading has been adapted from *A Citizen's Guide to Clean Air*, the Conservation Foundation, 1717 Massachusetts Ave., N.W., Washington, D.C. 20036 under contract with the U.S. Environmental Protection Agency, Catalog No. 71-187901, January 1972.

The 1970 Clean Air Amendments

This law requires that the Federal Environmental Protection Agency (EPA) set standards for emission of carbon monoxide, hydrocarbons and nitrogen oxides. On June 30, 1971, EPA announced a staged schedule for emission reduction which would ultimately result in the following maximum levels of the three major pollutants:

3.4 grams of carbon monoxide per vehicle mile (1975)

.41 grams of hydrocarbons per vehicle mile (1975)

.40 grams of nitrogen oxides per vehicle mile (1976)

The burden of achieving these standards rests with the automobile manufacturers who may request extensions in the timetable but must ultimately comply with this legislation.

Assuming that the automobile manufacturers do eventually meet standards, how reliable will the emission control devices be? The earlier devices have not proved to be entirely satisfactory. The *Washington Post* reported on August 29, 1971, that

> a seven-city survey of 1,000 privately driven 1970 models, averaging 9,000 miles use, found them exceeding their carbon monoxide ceilings by 100% and their hydrocarbons by 50%. EPA scientists do not know why these 1970s showed such poor results, but theorize that ignition and stalling problems prompted owners to take their cars in for adjustments that distorted the performance of emission controls, which rely on a retarded spark and a clean fuel-air mixture.

The 1970 Clean Air Amendments authorize the agency to test assembly-line models and require the manufacturers to do so also. The Act prohibits manufacturers or dealers from selling noncomplying vehicles and from removing or making inoperable any control device. Penalties for violation of this section are as high as $10,000 for each offense. EPA is required to publish the results of emission tests performed on prototype and assembly-line models of all makes of new cars. Citizens can consult the regional EPA offices to find out when the results are published in the *Federal Register*.

Beginning with 1971 model cars, manufacturers have been required to include in their new car warranties a guarantee that the car complies with applicable emission regulations and that it is free from any defects that would prevent it from complying during its useful life (five years or 50,000 miles). When better tests have been developed to check the performance of the emission control devices, the manufacturers must provide new warranties which require that they replace at their own expense any faulty control device if, during the car's useful life

1. The faulty device was maintained and operated in accordance with the manufacturer's instructions;

2. Failure of the device results in the owner being penalized, including the loss or right to operate the car, fines, and so on.

The law also provides a Federal program for the purchase of special low-emission vehicles for government use, once they are developed. Citizens may decide to urge their state and municipal governments to adopt similar purchase requirements. Once the Federal certification and purchasing program has stimulated the development of such vehicles, state purchases can help expand the market. The city of Boston has already announced its plan to convert all city-owned cars to run on liquified natural gas. Since the costs of fuel and maintenance for this fuel are lower than those for ordinary cars, Boston hopes to recover much of its initial changeover investment while reducing air pollution in the city.

State Responsibilities for Auto Emission Control

Although the 1970 Clean Air Amendments specifically prohibit states (except California) from setting their own emission standards for *new* vehicles they do retain the responsibility of controlling emissions for *existing* vehicles. This poses a number of problems, such as establishing vehicle inspection and enforcement programs, developing other control strategies and ensuring the availability of alternative modes of transportation.

Auto emission standards are only as good as their enforcement, and enforcement may be almost impossible without a practical, reliable inspection system. Many states are contemplating adding an emission inspection to their automobile safety inspection, but several factors should be considered before such a decision is advocated by citizen groups. One of these is the lack of simple and reliable testing equipment and procedures which produce replicable results. Several practical and reportedly accurate testing systems are under development, but they may prove expensive. Expense itself is another factor. Will the benefits of an inspection program outweigh the cost of establishing and maintaining it? The initial investment for a statewide system can easily run into millions of dollars, and the results of a few experimental programs have been disappointing. It is often difficult to get proper repairs for cars that have failed the test. Once the control device is adjusted, it may only remain that way for a couple of months. Emission control devices do curtail vehicle performance, especially in acceleration and idling. Thus, a third problem is the tendency of many motorists to adjust their cars properly only to pass the test, and then readjust them to operate more satisfactorily.

Another problem to be considered is the operational difficulties of administering a state-wide inspection program in states having varying amounts of air pollution, depending on the distribution of population, the distances between urban centers and meteorological conditions. Sparsely populated states may find the costs of operating such a system prohibitive. Finally, the heaviest burden of a vehicle inspection system may well fall on low-income car owners who often drive the older and less-cared-for problem cars and generally have poor access to public transportation to much needed jobs, schools and shopping.

There are alternatives to vehicle inspection systems which show promise for effective reduction of air pollution. These methods focus on reducing the total number of miles driven by all cars in a heavily polluted

area, instead of on the emissions of an individual vehicle. These control strategies include reduction of highway construction, restriction on driving in certain downtown areas, incentives to car poolers, taxes on mileage or on gasoline, express busways along existing freeways, and the development and support of high quality public transportation in urban areas. They are generally part of a state's "implementation plan"--that plan required under the 1970 Clean Air Amendments for the "implementation, maintenance and enforcement" of any air quality standard set forth by EPA.

Before advocating either an emission inspection program or alternative control strategies, citizens may want to do further research on the advantages and problems of each. One place to start is with two studies done for EPA by the Institute of Public Administration. These are Governmental Approaches to Air Pollution Control and Governmental Approaches to Automobile Air Pollution Control. Both studies present interesting discussions of the economic and administrative dimensions of different control strategies.

The Citizen's Role

In addition to curtailing the pollution from their own vehicles, citizens have several other responsibilities with respect to controlling automobile pollution. The first of these is being informed. The 1970 Clean Air Amendments recognize the right of citizens to know what the air quality situation is in their respective regions. States are thus required to gather emission data from individual sources, correlate them with the standards, and make this information available to the public. Citizens in some states may want to press their state agencies to make such reports available in local libraries or other accessible locations.

Even more important is attendance at and participation in public hearings. The Clean Air Amendments of 1970 declare that public hearings must be held in each state before it adopts an implementation plan and sends it to EPA for approval. Each state must

1. Provide at least 30 days' notice of a hearing through prominent advertisement of the hearing's date, time and place;

2. Make available for public inspection, in at least one location in each control region, the principal portions of the proposed implementation plan for that region;

3. Make available for inspection all rules and regulations proposed for inclusion in the plan; and

4. Keep hearing records that will contain, at a minimum, the list of those testifying, together with the text of each presentation.

Citizens may want to press state officials to hold a public hearing in their locale, even though technically only one is required in the state. Attendance of large numbers of people at hearings who support strong plans and testify to this effect, however briefly, will help counter the arguments of those who claim that environmental concern is a passing fancy. This testimony will help to build a good hearing record which is important in EPA's consideration of whether or not to approve the plan. Also, if there are any legal challenges to the plan, the court will base its decision, in part, on the hearing record.

Finally, the 1970 Amendments specifically recognize the right of citizens to bring suit against any violator of standards or other requirements of the Act. Any "person" may sue another "person" for failure to enforce or comply as required. "Person" is defined as "an individual, corporation, partnership, association, State, municipality, or political subdivision of a State." There are two limitations to this right: no one may sue EPA for an action not specifically required under the Act, and no one may sue his own state, except under certain circumstances. The Act authorizes any court to award any costs of litigation, including expert witness fees and reasonable attorney fees, to any party to a suit, as the court thinks appropriate. Although this provision removes one of the common deterrents to litigation by private citizens--expense--court action can still be very difficult and time consuming, and may not always be the most effective way to proceed. A good attorney should be consulted on the desirability of taking this kind of action.

Environmental Statements Required for Highway Projects

An FHWA Policy and Procedure Memorandum, PPM 90-1, gives guidelines for environmental statements that are now required by Federal legislation.

Section 102(2) (c) of the National Environmental Policy Act of 1969 requires statements on environmental impact to the Council on Environmental Quality. Section 4(f) of the Department of Transportation Act sets conditions on the use of certain public land. Section 470f of 16 U.S. Code requires consideration of effect on historic sites. Section 309 of the Clean Air Act of 1970 restricts Federal projects that have environmental impact on matters in the Act.

As the PPM states, it is a national policy that all Federal agencies promote efforts for improving the relationship between man and his environment and to make special efforts for preserving the natural beauty of the countryside and public park and recreational lands, wildlife and waterfowl refuges, and historial sites.

It is also national policy that Federal agencies consult with other appropriate Federal, state, and local agencies; assess in detail the potential environmental impact in order that adverse effects be avoided and environmental quality is restored or enhanced, to the fullest extent practicable; and utilize a systematic, interdisciplinary approach which will insure that integrated use of the natural and social sciences and the environmental design arts in planning and decision making which may have an impact on man's environment. The environmental assessments include the broad range of both beneficial and detrimental effects.

An environmental statement for a highway project must include the following information: (1) A description of the proposed highway improvement and its surroundings. (2) The probable impact of the proposed development or improvement. (3) Any probable adverse environmental effects which cannot be avoided should the proposal be implemented. (4) Alternative locations or designs with complete descriptions. (5) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. (6) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action

should be implemented. (7) Where unavoidable adverse environmental effects are encountered, planning measures taken and proposed to minimize harm to be identified, including those relating to Section 4(f) lands. (8) Final statements to incorporate all comments received on the draft (including environmental comments contained in the public hearing transcript) along with a discussion of the comments and suggestions.

A proposal to develop or improve a highway section should be coordinated in the early stages with appropriate local, state, and Federal agencies under regular FHWA procedures. Coordination at the beginning of the location study will assist in identifying natural and cultural areas of significance, agency and public concerns, and help in determining the need for and preparation of an environmental statement.

Draft environmental statements must be furnished to the Council on Environmental Quality (10 copies), the Department of Transportation's Office of Environment and Urban Systems (3), the FHWA Office of Environmental Policy (2), and the FHWA Regional Office (1). Thirty to 45 days must be allowed for comments. The statements must be available for review by the public and at the appropriate public hearings. They will also be made available for purchase from the National Technical Information Service.

The final environmental statement shall include a copy of all comments received and reflect the consideration and disposition of the environmental comments at the public hearing and the comments received on the draft statement. Negative declarations shall be prepared when the anticipated impact of construction and operation of a highway section is determined to be not of major importance.

Environmental statements must be prepared for all highway sections financed with Federal funds which received design approval after February 1, 1971. For such highway sections that received design approval between January 1, 1970, and February 1, 1971, statements must be prepared if the FHWA Division Engineer judges it to be necessary for full implementation of the National Environmental Policy Act.

In addition, the National Environmental Policy Act also applies to new airports and several other major projects that would significantly affect the environment. The Act is designed to encourage environmental considerations at the earliest levels of decision-making for all of these areas in an attempt to harmonize transportation planning and programs with the surrounding environment.

Process Guidelines for the Action Plan

The work of the highway official has shifted dramatically in recent years. In the early days, highway funds were largely spent on improvements to existing substandard roads. Today, highway projects often go where there never has been a road, and find it increasingly difficult to avoid encountering housing development, scenic view, or park. Not too long ago, measures to soften the environmental impact of highways were often seen by the public as extravagant frills. Now the public pressures for funds to be spent in this direction. The highway official, state and local, has

long been aware of the potential impact of his work. To build a road, one must fell the tree, lower the hill, bridge the river. Highway experts have sought to soften these impacts--experimenting with planning techniques and improving construction methods.

In response to public demand, Congress has enacted a series of requirements and authorizations to help the highway administrator protect the environment:

- The 1950 Federal-aid Highway Act created public hearing requirements.
- In 1962, legislation called for greater participation by local officials, and coordination of urban transportation plans with an area's comprehensive plan.
- In 1966, Section 4(f) of the Department of Transportation Act called for special efforts to avoid taking land from parks, wildlife refuges, and historic sites.
- The landmark National Environmental Policy Act of 1969 required that a written evaluation of the environmental impacts of each significant project be circulated to other agencies and the public; that project development include a multi-disciplinary approach; and that alternate plans be developed.
- The Federal-aid Highway Act of 1970 contained Section 136(b), designed to make sure that each state would fully consider the impacts of any and all proposals for highways within that state.

Section 136(b) called on the Secretary of Transportation to assist states to reach this goal by issuing guidelines--general directions to the states for incorporating, in highway decisions, factors of economic, social and environmental significance.

Federal highway authorities felt that a *process* approach would be most practical to the guidelines. The *process* approach requires each state to detail the process or procedures that it will follow to make certain it will give proper consideration to the effects of its highway works. This detailing of a state's individual procedure is called its *action plan*. The *process* approach and its required plans recognize that the definition of environment can often best be made by a community itself and provide means of doing this through involvement of the public and other agencies.

Specifically, the guidelines spell out four fundamentals that an action plan must satisfy, each fundamental to be developed by a state and used in its highway programs. The guidelines only point the way.

The first fundamental is *identification*. A state highway department must build a competency in identifying and objectively studying the impacts of a highway project--economic, social, environmental. It must have the experts on its staff, or available as outside experts or consultants, who can make professional, in-depth studies. Although other

agencies can assist in these studies, the state must have a competent, qualified source of expertise. Without this competence, a state highway agency would have difficulty convincing the public that its decisions are based on a knowledgeable balancing of transportation, economic, social, and environmental issues.

The second fundamental is the requirement that a state highway authority develop an *interdisciplinary* approach to highway projects... from early systems planning to final design...since not all the impacts and problems involved in a highway plan are exclusively of an engineering nature. The action plan must show how a state will have the expertise of other disciplines to assist the state's investigation into a project's various by-products, especially those of a non-transportation nature.

The third fundamental is *involvement*. Other agencies, and the public, must be involved in the planning, location, and design of a highway, in a manner each action plan spells out.

Only by such involvement can impacts be forced to surface that highway specialists--unassisted--might not recognize. Only by such involvement can public attitudes toward a specific project be determined as a vital ingredient in the making of decisions in the public interest. Only by such involvement can public confidence in a state highway agency's knowledge and fairness be maintained.

The fourth fundamental is *alternatives*. Every highway study must contain alternatives, or choices. This requirement guarantees that a highway agency will actually consider possible alternatives, and evaluate the pros and cons of each.

This requirement assures the public a chance to judge the options, rather than being presented with a single solution, and being asked to give it a yes or no. This requirement allows an agency and its public to compare the costs and benefits of taking a particular action versus a decision of no build.

Citizens may want to obtain a copy of their state action plan for review in light of these four process requirements. The specifics of the processes the states will outline in their action plan are of their choosing. Standardization of action plans is not required, or desired. The guidelines are general enough to allow each state to adopt procedures to suit its own unique situation. Thus, although each state must, for example, provide for public debate, how this is done is left to each state.

Hopefully, there will be originality and inventiveness in the way the various states elect to meet the obligations set down by the guidelines.

The development of these action plans will be a major undertaking for every state. It will, in many cases, entail significant changes in highway agency organization and procedures, the acquiring of new expertise, and the development of new areas of responsibility within highway agencies.

It offers the opportunity to bring about a solution to many of the problems that began that day long ago when the first horse trail was broadened that a car might pass.

Above all, the action plan may prove to be the answer to that dilemma of the highway administrator and engineer in our time--the need of the nation for roads, and the desire of the nation for an environment that is safe, quiet, and beautiful.

PUBLIC HEARINGS IN HIGHWAY PLANNING*

The federal Department of Transportation provides for a two hearing procedure to give all interested persons an opportunity to become fully acquainted with highway proposals that concern them and to express their views at a time in the process when the plans are still flexible. The first hearing, called a "corridor public hearing," is held before the route location is approved and before the state highway department is committed to a specific plan. The second hearing, called the "highway design public hearing," is held after the route location has been approved, but before the state highway department is committed to a specific design proposal. Both of these hearings are intended to give citizens the opportunity to present their views on the need for the road, its location, design, and social, economic and environmental effects. Other informal public meetings or additional public hearings are encouraged whenever they serve the public interest.

Both a corridor and a design hearing must be held for every Federal-aid highway project that is in a new location, or would have a different social, economic or environmental effect or would change the layout or function of connection roads or streets. Hearings are not required for such improvements as resurfacing, widening existing lanes, adding lanes, installing traffic lights or similar improvements.

A public hearing is to be well advertised in advance. Notices of the hearing must be published at least twice in a newspaper prior to the hearing date. Relevant public officials and private citizen groups are also to be notified. The hearings are to be held at a place and time that is convenient for the people affected by the highway.

At the hearing itself, the state highway department is to make available a map or other drawing which shows the area being considered. The various proposals will be presented by a representative of the state highway department, comments will be offered by elected and appointed officials, and statements or questions will be solicited from the participants. A complete transcript of the proceedings of public hearings must be prepared by the highway department for submission to the Federal Department of Transportation and retention in their files.

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*This reading is excerpted from U.S. Department of Transportation, Federal Highway Administration Policy and Procedure Memorandum 20-8, January 14, 1969, "Public Hearings and Location Approval."

PERTINENT LAWS AND REGULATIONS CONCERNING TRANSPORTATION PLANNING*

Following is a partial listing of the principal Federal-level laws, regulations, and directives which cover various aspects of the transportation planning and environmental assessment process with emphasis on the Federal-aid highway program.

1. *National Environmental Policy Act of 1969,* Public Law 91-190 (42 United States Code 4321-4347).

2. *Highways, Title 23* of the United States Code. Title 23 contains most of the Federal legislation that is directly applicable to the Federal-aid highway program. Among the most important provisions are the following:

   Section 109(h)--consideration of possible adverse social, economic and environmental effects

   Section 109(i)--development of highway noise standards

   Section 109(j)--consistency with air quality plans

   Section 128--public hearings

   Section 132--preservation of parklands

   Section 134--cooperative comprehensive planning

   Section 142--public transportation coordination

3. *Department of Transportation Act of 1966,* Public Law 89-670 (49 United States Code 1651-1659). This Act established the U.S. Department of Transportation. Section 2 contains a statement of purpose and outlines several aspects of the nation's transportation policy. Section 4(f) provides special protection for public parklands, recreation areas, wildlife and waterfowl refuges, and historic areas.

4. *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970,* Public Law 91-646. Establishes standards and procedures governing all property acquisition and relocation programs undertaken in conjunction with Federal or Federally-assisted programs, including highways.

5. *National Historic Preservation Act of 1966,* Public Law 89-754 (16 United States Code 470). Expanded the National Register of Historic Places and created the Advisory Council on Historic Preservation.

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*Excerpted from "Getting Involved in Transportation," U.S. Department of Transportation, Office of Environment, Safety, and Consumer Affairs, 1976.

Section 106 of the Act creates a special review for all Federal projects which affect properties on the National Register.

6. *Executive Order 11514, Protection and Enhancement of Environmental Quality*, March 6, 1970. Provides additional guidance to all Federal agencies in carrying out their responsibilities under NEPA.

7. *Executive Order 11593, Protection and Enhancement of the Cultural Environment*, May 13, 1971. Expands the coverage of the National Historic Preservation Act (see Item 5, above) to include properties eligible for inclusion on the National Register as well as those which have been formally recognized.

8. Council on Environmental Quality, *Guidelines for Preparation of Environmental Impact Statements*, 40 Code of Federal Regulations Part 1500, August 1, 1973. Provides detailed guidance to all Federal agencies responsible for implementing the policies and procedures established by NEPA.

9. *Archeological and Historic Preservation Act of 1974* (May 24, 1974), Public Law 93-291. Expands the application of the 1960 Act providing for the preservation of historical and archeological data to include all Federal or Federally-assisted construction projects, rather than being limited to Federal dams and reservoir sites.

10. U.S. Department of Transportation, *Procedures for Considering Environmental Impacts*, DOT Order 5610.1B, September 23, 1974. Supplements the CEQ guidelines (see Item 8, above) and provides for the environmental assessment of all transportation programs and projects undertaken or supported by U.S. DOT and its modal offices.

11. Federal Highway Administration, *Federal-aid Highway Program Manual*. The Federal-aid Highway Program Manual contains all FHWA program directives which govern the Federal and Federal-aid highway programs. These directives were formerly issued as Policy and Procedure Memoranda (PPM's) and Instructional Memoranda (IM's), etc.

    The Program Manual is divided into seven volumes. While every volume contains items of interest to persons involved in transportation planning and environmental assessment, Chapter 7 of Volume 7, entitled *Environment*, contains the directives of greatest relevance. The contents of Chapter 7 are listed below:

    Volume 7, Chapter 7: *Environment*

    Section 1: Process Guidelines (for the development of Environmental Action Plans)

    Section 2: Environmental Impact and Related Statements

    Section 3: Noise Standards and Procedures

    Section 4: Archeological and Paleontological Salvage

Section 5: Public Hearings and Location/Design Approval

Section 6: (Reserved)

Section 7: (Reserved)

Section 8: Joint Development of Highway and Multiple Use of Roadway Properties

Section 9: Air Quality Guidelines

12. Council on Environmental Quality, *102 Monitor*. In its capacity as the administrator of NEPA, CEQ publishes a monthly listing of all draft and final Environmental Impact Statements received by the Council. In addition, the 102 Monitor contains a list of the Environmental Protection Agency's comments on pending EIS's (filed under the provisions of Section 309 of the Clean Air Act); items of current concern in NEPA case law; and information on the environmental programs of the Council.

HIGHWAY BEAUTIFICATION ACT OF 1965*

Title II of the Highway Beautification Act provides for the control of junkyards which are within 1,000 feet of the nearest edge of the right-of-way and visible from the traveled way of the interstate and Federal-aid system.

The act also provides reimbursements to the states, the District of Columbia, and Puerto Rico for 75 percent of eligible landscaping and screening costs and for 75 percent of the cost of just compensation for the relocation, removal or disposal of those junkards which cannot as a practical matter be screened.

The law further stipulates that the states must enact legislation to control future junkyard locations through licensing and zoning, and thereby avoid the expense of bringing new facilities into compliance.

Junkyards located in industrially zoned areas or in unzoned industrial areas of similar character are exempt from control under the Federal law.

Failure by the states to comply with the provisions of the Highway Beautification Act could subject them to a penalty of a 10 percent reduction of their annual Federal-aid highway funds.

To determine the extent of the problems adjacent to the Interstate and Federal-aid primary systems, all 50 states, the District of Columbia, and Puerto Rico have made a detailed inventory of all junkyards adjacent to these systems as of October 22, 1965. The inventories show that approximately 80 percent of the junkyards can be concealed from the main traveled way by natural objects, plantings, fences, or other means. The remaining 20 percent must be relocated, removed, or otherwise disposed of.

Each location to be screened must be treated individually to meet the specific condition. It is not the intent to conceal a place of active business but merely to soften the visual impact of the exposed junk. The screening should extend beyond and blend with the immediate area. The following general types of screening warrant consideration.

1. Highway border plantings of trees, shrubs, etc., of a size and density that will largely impair view across the right-of-way line.

2. Earth mounds graded and rounded to a reasonably natural appearance and planted with grass or nonmowing ground cover.

3. Open wire, chain link, wood, or other fences covered with vines to provide the effective screen.

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*This reading has been adapted from *Junk and Control: Highway Beautification Act of 1965*. U.S. Department of Transportation, Federal Highway Administration, 1967.

4. Open wire, chain link, wood, or other fences with inserted light metal, wood, or plastic strips to provide the screen cover.

5. Solid or semisolid fences such as board, picket, or sapling wood types; metal with lightweight panels, expanded mesh, and other commercially available types (100 percent screen at all angles of view is not considered essential): or other available materials such as fiber glass or asbestos board panels.

6. Walls, preferably pierced or open type, of stone, brick, concrete block, or some combination of materials in keeping with the general area, limited to practical heights.

7. Combinations of the above.

When planting alone is used, it is more desirable and economical to provide an open screen effect. Glance views of junkyards at normal highway speeds are not objectionable. A solid screen may be unnatural and inappropriate in relation to the adjacent roadside vegetation and development. Plants should be of varieties comparable to those which exist in the area. Fully mature trees should rarely be used as they may have a low survival rate. Plants should be of a variety that will grow relatively fast so that effective screening is attained within a 2- to 5-year period. In many instances, planting may be accomplished within the presently owned State right-of-way. Where this cannot be accomplished, it will be necessary to arrange with the owner to screen the junkyard on his property.

BENEFICIAL EFFECTS OF HIGHWAYS ON THE ENVIRONMENT*

Well, are we paving the country?

Far from it. All roads, including city and suburban streets, occupy less than one per cent of the land area in the United States. Federal studies in nearly 50 larger cities show that the percentage of land occupied by roads in developed areas is declining. The land is being used for larger lots, more open spaces, landscaped areas. Overall, even with the growth of new arterial highways and expressways, roads take up no greater percentage of the nation's urban areas than they did before the auto was invented.

But aren't we still building a lot of new highways?

Not as many as it would seem. The great bulk of our work, carried out by the New York State Department of Transportation and other transportation agencies throughout the nation, is being done on or near existing roads. Only a small part of our total highway construction mileage involves building roads through totally new areas.

Well, then, why are we spending so much on highway work?

Roads become worn out and outmoded. We have more people, more vehicles and, most importantly, more usage of these vehicles all the time. A highway built in the 1920s or 1930s in a rural area may well be a congested, dangerous route today, bordered by mushrooming residential or commercial development. Such a road, and there are many of them, should be replaced with a safe highway built for today's traffic demands and the demands of the future.

The interstate highway system now coming into being throughout the nation is adding 42,500 miles of new expressways. This is only a bit more than one per cent of the nation's road and street mileage, but it will carry more than 20 percent of the travel. This means freeing older roads of congestion, making all highways easier to travel and safer. In New York State, with all but 15 percent of its 1,350 miles of interstate highways in service, these new highways are removing traffic pressures in both rural and urban areas, saving time and money for highway users. Most of all, they are saving lives. Federal officials report that a life is saved each year for every five miles of new interstate highway placed in service. For New York State, that means 230 lives a year being saved now and 270 lives when the system is completed.

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*This reading consists of excerpts from "Are we Paving the Country?" distributed by the State of New York Department of Transportation and "Benefits of Interstate Highways," distributed by the U.S. Government Printing Office.

Couldn't a lot of this highway travel be accomplished by public transportation?

It can be and is, in the large cities. Elsewhere, the private passenger car is the workhorse of passenger transit, accounting for 98 percent of the intercity travel. In most cities, public transit means buses--and they need highways too. Even in the metropolitan areas, cars are needed to get to airports, train and subway stations, bus stops. The fact is that the private car gives a freedom of mobility and wide open schedule for travel that makes it the most used mode of transportation by far.

Large-scale technological improvements such as the interstate highway system often result in profound and sometimes irreversible changes in the natural and manmade environment. Interstate highways can play a vital role in protecting and enhancing the desirable elements of the physical environment, for example, by increasing opportunities for people to enjoy the beauty and uniqueness of the environment, through greater accessibility. Independent alignment of dual lane interstate highways improve erosion control, restriction of billboard advertising, and selective tree trimming, all contribute toward increasing opportunities for enjoyment of the environment while protecting its ecological structure. Also, highway agencies frequently develop or assist in programs to protect environmental features of scenic, historical, educational, recreational, symbolic, or ecological significance. For example, a number of states have used interstate construction to create recreational lakes from excavations for highway construction, rest areas utilizing Indian mounds, dinosaur tracks, or other historic or natural features.

Interstate highways can have a significant beneficial impact in reducing air and noise pollution in urban areas. Interstate highways, often constructed to bypass downtown areas, reduce unnecessary travel through downtown areas where existing noise and air pollution levels are high. Also, interstate highways eliminate considerable pollution and noise effects of stop-and-go traffic on city streets. The following (from the *American Roadbuilder*, January 1969) shows the dramatic improvements expressways can make in reducing automobile carbon monoxide emissions.

Type of Traffic Situation	*Pounds of Carbon Monoxide per Vehicle Mile*
Expressways	0.11
Arterial streets	.22
Local streets	.27
Central business district	.42

The primary reason for this very significant difference in carbon monoxide emissions is that the amount of unburned gasoline increases sharply when an engine is accelerated or decelerated. For example, when an automobile is cruising less than 2 percent of the total fuel supplied to the engine is emitted unburned through the exhaust pipe. During deceleration, this increases dramatically to 18 percent. Average speed also plays an important role. A change in speed from 20 mph to 30 mph yields

a one-third reduction in total emissions. Air pollution emissions are at a minimum when vehicles are traveling at a relatively constant speed such as on interstate highways. Similarly, interstate highways reduce the more disturbing peak noise levels created by trucks and other noisy vehicles by reducing the need for acceleration and deceleration generally characteristic of travel on neighborhood streets.

Recent advances in the design of interstate highways not only make them more esthetically appealing, minimize neighborhood social and economic disruption, but are also beneficial in terms of reducing air and noise pollution levels. For example, a modern, well designed, elevated structure is visually pleasing, does not inhibit mobility and reduces noise levels in nearby areas. Depressed areas also reduce noise levels. Some interstate highways are now being designed with exclusive bus lanes which will reduce air and noise pollution by decreasing the number of autos and by providing free-flowing bus traffic. Interstate highways help reduce air pollution levels in urban areas by another indirect way. The relationship between interstate highway improvements and industrial decentralization is well known. Both the benefits and hardships of the movement of industry from the center city have been well documented. Evidence is mounting that urban air pollution problems are caused not only by the presence of such things as smoke stacks and automobiles, but by the overall spatial and temporal arrangement of these urban elements--in short by urban form.

USE OF AIRCRAFT TO HELP THE ENVIRONMENT*

Many of the positive effects aircraft have on the environment take place in relatively unpopulated areas, thereby escaping notice of the public in general. Occasionally, headlines may highlight some spectacular happening, involving aircraft, but the day-in, day-out operations take place with little fanfare. These routine aircraft operations affect the environment beneficially in the following ways.

Agriculture

Airplanes and helicopters apply seeds, fertilizers, herbicides, insecticides and growth regulators to various crops. Aircraft are able to give better coverage to the crops and can accomplish the work more quickly and effectively than ground operated equipment. In addition, many farmers are utilizing aircraft for planning and checking on farming operations.

Today practically all rice is sown from the air, along with barley, wheat, alfalfa, ladino clover and many other small-seeded plants. Tomatoes are dusted when fields are wet, before worms can cause damage. Weeds, such as blue mustard, can be controlled. This weed can reduce wheat yield by 20 bushels per acre through the existence of only nine weed plants per square foot. During and after spring rains, aircraft can make these applications without destroying newly sprouted crops or becoming mired in the mud which would entrap ground vehicles.

Even better quality, more reasonably priced clothing, can result from agricultural spraying. The boll weevil, scourge of the cotton planter in the early 20th century, has been all but eliminated through aerial application of pesticides. Defoliating agents applied to cotton plants prior to picking allow mechanical harvesters to pick bolls relatively free of leaves and other extraneous plant material. The absence of these impurities allows fewer processing actions, longer staple length, and, ultimately, a better product.

Livestock Production

The airplane has long been one of the livestock producer's handiest tools. Inventory and control of herds is now regularly accomplished from the sky, covering in a matter of hours what would have taken days or weeks by horseback.

When winter blizzards howl across the plains, piling deep snow drifts and cutting herds off from food supplies, aircraft lift hay and grain to stranded animals. Aside from the aversion of economic loss to the rancher, cattle are saved for market, thereby assuring more plentiful and less costly beef to the consumer.

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*Adapted from *Aircraft and the Environment*, Federal Aviation Administration.

Forest Management

In 1971, the U.S. Forest Service flew a total of 96,539 hours; 75,984 in fixed-wing aircraft, and 20,555 in helicopters. Of this total, 73,897 were flown in fire control activities, 5014 in timber management, and 3581 in engineering work with the balance for miscellaneous activities. In addition to government activities, private timber companies utilize aircraft extensively for management of their reserves.

Firefighting Activities

As indicated by the aforementioned statistics, forest fire control activities utilize the largest percentage of aircraft hours flown. In 1971, the Forest Service fought 2812 forest fires with the help of aircraft. Aircraft enable rapid investigation of the extent of fires and provide a picture of the best access to and means of fighting a fire once one starts. Aircraft provide a rapid method of fire-fighting by dumping borate or water, versus having ground-based fire fighters drive to the area with the attendant time delay in ground transportation. The Canadian "scooper duper" amphibian fire bomber can drop 252 tons of water in 5 hours. Helicopters are used to transport personnel to the fire area, permitting fighting of the fire while it is still in the early stages and often preventing its spread. When helicopters are unavailable or unsuitable, airplanes often carry "smoke jumpers"--specially trained parachutists who can quickly get into otherwise inaccessible areas. Aerial observation of a fire in progress enables a rapid and accurate method of directing ground personnel in their fire fighting efforts.

By saving millions of acres of valuable timber from the devastating effects of fire, a more plentiful supply of lumber is available for home building and other purposes.

Forest Seeding and Fertilizing

After trees have been cut from a forest area, sound management practices dictate a reforestation effort in order to preclude erosion and to establish a new stand of timber for future harvesting. Hand planting of seedlings is effective, but time-consuming and costly. Aircraft, dropping pine, fir or other evergreen seeds, can cover cut-over areas in a matter of minutes. Although many seeds do not germinate, experience has proven that enough will to do an effective replanting job. Once seeds have been sown, fertilizers are applied from the air to promote rooting and plant growth.

Insect/disease Control of Forest Areas

Trees, like other living plant life, are susceptible to infestation by borers, insects, fungus and other damage-causing bodies. Plant diseases, like human diseases, can assume epidemic proportions and can wipe out large forest areas if not brought quickly under control. Such diseased forest areas are quickly detectable from the air through the use of techniques such as infrared photography and other sophisticated methodology. Once detected, forests can be sprayed by aircraft to eliminate disease threats.

Selective Logging Practices

Normal logging practices often cause great devastation to forest areas. Numberous roads must be cut to allow access to logging trucks, bulldozers and other heavy equipment. Areas are clean cut to allow easy retrieval of marketable timber. The results are often scarred and eroded hillsides, unsightly piles and brush and felled trees too small to be of value, and destruction of natural wildlife cover. Although still in the developmental stages, aircraft have shown the potential to change this.

Helicopters, and in a few instances, aerial balloons, are being used to lift logs from cutting areas to a central collection point. This eliminates the need for roads and allows selective cuttings of only marketable trees. It also allows previously inaccessible areas to be selectively logged without destroying their surroundings.

Game Management

Aircraft add a great deal of flexibility in the area of game management. More accurate inventories are possible from the air. Animals can be tagged, studied and redistributed to more provident areas through the use of aircraft. In wintry weather, where starvation becomes a real threat, hay and other foodstuffs can be air-dropped at strategic locations. And, to the delight of the avid angler, remote lakes are stocked with fish.

Weather Control

Present weather experimentation, such as cloud seeding by aircraft, will undoubtedly some day allow man to more effectively control his environment. Already man can produce rain in some dry areas with some degree of assuredness. Experiments with fog dispersal are also underway. Through the use of high-flying aircraft, man can also effectively monitor such things as radiation levels, particulate matter, and upper-air moisture content. Aircraft constantly penetrate hurricanes and thunderstorms to learn more of the destructive effects of nature. Through increased knowledge, man will be able to save untold suffering and property damage now inflicted by natural forces.

Energy Related

The rising demand for more energy; electricity, gas, oil, and coal by the American public will undoubtedly require more transmission lines to move it from its source to its ultimate consumer, e.g., the controversial Alaska pipeline. Helicopters are already extensively used for transporting and erecting towers and transmission lines and pipeline components in remote areas. Aside from being more economically effective, helicopters allow construction techniques which do minimal damage to the environment.

Once these lines are installed and in operation, aircraft regularly patrol them to inspect for damage or leakage. Quick detection by aircraft of oil leaks, for example, and subsequent movement of repair crews by helicopter would prevent any substantial environmental damage.

Insect Control

Disease-carrying insects, such as the malarial mosquito, once took a large toll in human suffering. By teaming the airplane with effective insecticides, most such threats have been either eliminated or kept in check. The recent ban on widespread usage of DDT as a control agent sent currents of alarm throughout the world. Undoubtedly, other agents will be developed, but without the airplane to apply them, the agents would lose much of their effectiveness since areas such as swamps are virtually inaccessible to other means of transportation.

Efficiency as a People-mover

Aircraft produce fewer pollutants per passenger mile than any other form of motorized transportation we enjoy today, with the exception of rail travel.

As an example of relative pollution intensities, we might compare a New York City to Chicago trip by a B-727 aircraft carrying 100 passengers with a trip by auto carrying 4 passengers. The total amount of emissions is 12.8 pounds per auto passenger compared with 1.9 pounds per aircraft passenger. Economies of scale with the wide-bodied jets reduce this figure even lower.

If the 183,000,000 passengers enplaned by the domestic airlines for 1972 were forced to utilize conventional motor vehicles as an alternative, the increased number of vehicles required and the resultant pollution levels would cause considerably more pollution.

Pollution Spotters

Aircraft today are continuously monitoring antipollution efforts. Oil spills on oceans, lakes and rivers and leakages from off-shore wells can be effectively tracked and control efforts directed from aircraft. Pollution sources in rivers and creeks can be traced from the air, especially when water or surface travel is hindered by rapids, private property rights, and other obstacles. Aircraft also routinely monitor compliance with air pollution standards.

THE EFFECT OF NOISE ON MAN AND THE NATURAL ENVIRONMENT*

It is generally agreed that noise has adverse effects, residents of areas near airports and freeways need no convincing. If we are to restore our peace and quiet we must have sufficient understanding of the effects of noise to direct us to suitable action. This reading describes the effects of noise on man and on the natural environment.

Noise-induced Hearing Loss

How much noise can the human ear tolerate? Attempts have been made to answer this question for continuous noise exposure in work environments. The problem of estimating critical noise levels for transportation noise is more difficult because of its irregularities, for example, airplane departures and landings. The main impact of transportation noise on personal well-being may be its aggravation of a hearing impairment already induced by the noisy work environment. Consider, for example, an individual exposed to high noise levels at work, traveling to and from work, and at home trying to relax or sleep. This endless exposure to noise may hasten the onset of serious hearing losses, nerve damage and poor health.

It is presently an extremely difficult task to specify the allowable exposure for brief and intense (ten seconds) transportation noise exposures. A maximum tolerable limit for the unprotected ear can be set at 120-135 dB. Current data on transportation noise levels suggests that *by themselves* these irregular transportation systems maintain constant high levels of noise (85-90 dB(A) and up for 8 hours per day), then there exists a serious risk of hearing impairment.

Nervous System Responses to Noise

Noise can cause the body to activate its defense system, the autonomic nervous system, which controls many critical bodily processes (heart output, hormone control, digestion). Noise is responded to as a stress, and the more stresses bearing on man at any given time, the quicker the bodily defenses can be overwhelmed. The specific effects noise has been shown to have on man, depending on its intensity and duration, include an increase in muscular tension, sweating, metabolic changes, reduced gastrointestinal activity, nausea, headaches, tinnitus, drowsiness, respiratory irregularities and emotional disturbances. Although these effects are signs of autonomic arousal, this is *not* necessarily dangerous to the organism unless the arousal is maintained for prolonged periods of time causing depletion of bodily defenses.

Sleep Disturbance

One of the chief complaints about transportation noise is its disturbance of sleep and relaxation. The major offender is the airplane, owing

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*The reading has been adapted from *Transportation Noise Pollution: Control and Abatement*--edited by David O. Dickerson, 1970. Summer Faculty Fellowship Program in Engineering Systems Design, ASEE-NASA Langley Research Center, Old Dominion University Research Foundation.

to its loudness and unexpectedness. Disturbance of sleep is of primary importance because of its necessity for normal psychological and physiological functioning. Aggravated sleep loss has a profound effect on body health, particularly for the aged and the sick, and can become a significant factor in personal well-being. Testimony before a state legislative committee on jet noise in New York cited paranoid delusions, hallucinations, suicidal and homicidal impulses as some of the possible consequences of continuous sleep loss.

The levels of noise that sleepers can tolerate vary widely. A mother is awakened by her baby's cries while the father sleeps peacefully. A dripping faucet can prevent sleep. A jet transport screeches overhead and startles the sleeper awake. Although it is not obvious what characteristics are shared by these sounds, certain fundamental rules can be set forth:

- The louder the noise, the greater the disturbance of sleep
- The more meaningful the sound, the greater the chance of disturbance
- The more unexpected the noise, the greater the chance of being awakened
- The greater the presence of certain personality traits, i.e., neuroticism, the greater the sensitivity to noise
- The younger the child, the greater the susceptibility to interference from aircraft noise
- The greater the age or poorer the health, the lower the resistance to noise disturbance

Psychological Effects of Noise

Noise can have a deleterious effect on man's day to day existence. There is no reported research on the psychological effects of transportation noise, but there are some inconsistent findings on noise in the work environment. A large portion of the research concludes that noise causes a significant increase in work errors and the quantity of work produced. The same applies to students in school. Other studies conclude that individuals with high levels of anxiety perform better under noisy conditions than under quiet ones. Most of the research agrees that the psychological effects of noise vary with the quality of the sound--its duration, direction, frequency and unexpectedness.

Effects of Transportation Noise on the Natural Environment

Noise seems to accompany man wherever he goes. Outdoor recreation has become more and more mechanized and more and more noisy. The burgeoning popularity of trail bikes and snowmobiles has taken man into the quiet forest and mountains in a very intrusive and noisy manner.

The noise of snowmobiles terrifies wildlife already immobilized by deep snow and in a weakened condition. The exertion of fleeing through deep snow is harmful and can be fatal. Low flying aircraft also constitute a source of terrifying noise which affects wildlife and farm animals.

THE AIRPORT NOISE PROBLEM*

The major cause of noise complaint in the last 15 years is the noise around airports. Community responses to airport noise are in some ways unique but in others resemble complaints about any noise irritation.

Studies of relations between aircraft noise exposure and annoyance have helped determine major acoustical and sociological factors affecting annoyance. Annoyance in general results from interference with normal living activities from the noise itself and from vibrations it causes in structures. Activities commonly disrupted include TV and radio enjoyment, rest and sleep, conversation, reading or concentrating, eating and working.

Disturbances can be more insidious and subtle than we may recognize. In one survey a totally deaf man, using sign language, indicated he was unable to sleep because aircraft caused vibrations which shook the house and bed. Residents near major airports have indicated alterations in social relations due to noise. Speech interference has led to friction and hostility among family members and sometimes deterioration of interfamily relationships.

Some of the more important sociopsychological factors known to affect strongly the annoyance produced by a given aircraft noise intrusion include

1. Fear of aircraft crashing
2. General attitude about noise
3. General attitude about residential environment
4. Beliefs about the preventability of aircraft noise
5. Belief in the importance and value of airports and air traffic
6. Belief in the possible effects of noise on health

These factors can be as important as the noise exposure itself in determining annoyance reactions. Thus an individual's reaction to noise seems to be only a part of a more general adjustment to the local environment.

Research suggests that the actions of people sufficiently annoyed with aircraft noise vary from complaining to officials to attempting to abate the effects of noise by keeping windows shut, sleeping with earplugs, and insulating homes. These individual responses mold into community efforts as noise levels and exposure times increase and as it becomes clear that the failure of individual remedies makes a community wide or political solution necessary.

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*The reading has been adapted from *Transportation Noise Pollution: Control and Abatement*--edited by David O. Dickerson, 1970. Summer Faculty Fellowship Program in Engineering Systems Design, ASEE-NASA Langley Research Center, Old Dominion University Research Foundation.

Community reaction to airport noise may be conveniently depicted as a chain of possible events:

EXPOSURE ⟶ ANNOYANCE ⟶ COMPLAINT ⟶ PROTEST

There is no evidence that the people who complain or protest noise are extra-sensitive to that noise, but they do tend to be more convinced that the noise could be prevented and that it affects their health.

THE NOISE CONTROL ACT OF 1972*

Background Legislation

Recognition that noise is an environmental problem that affects people other than workers has been late in coming. Federal noise legislation first appeared in 1968 when Congress directed the Federal Aviation Administration (FAA) to establish rules and regulations to control aircraft noise.

At the state and local level, laws tended to treat noise as a public nuisance, and enforcement was both difficult and spotty. More recently some jurisdictions, notably California and Chicago and New York City, have established new laws and ordinances that are based on noise generating characteristics of specific equipment and, hence, are easier to enforce.

The Clean Air Amendments of 1970 called for the establishment of an Office of Noise Abatement and Control in the U.S. Environmental Protection Agency (EPA). The legislation also called for public hearings of environmental noise and a special report to the Congress on the problem, incorporating the results of the public hearings and other special studies. Information from this EPA report as well as extensive Congressional hearings formed the basis of the Noise Control Act of 1972.

The Noise Control Act of 1972

The Noise Control Act of 1972 represents the first major Federal attempt to eliminate excess noise at the design stage of a wide variety of new consumer products.

Major Provisions

The EPA is directed to develop and publish information on the limits of noise required for protecting public health and welfare as well as a series of reports to identify products that are major sources of noise and to give information on the techniques for controlling noise from such products.

Using the criteria thus developed, the EPA Administrator is required to set noise-emission standards for products that have been identified as major sources of noise and for which standards are deemed feasible. The law requires such standards to be set for products in the categories of *construction equipment, transportation equipment* (except aircraft), *all motors and engines, and electrical and electronic equipment*. It also grants authority to set for other products, standards deemed feasible and necessary to protect public health and safety.

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*Taken from the *Noise Control Act of 1972; Highlights*. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

EPA has authority to require the labeling of domestic or imported consumer products as to their noise-generating characteristics or their effectiveness in reducing noise-generating characteristics or their effectiveness in reducing noise. Manufacturers or importers of non-conforming or mislabeled products are subject to fines of up to $25,000 per day for each violation and to imprisonment for up to one year. Manufacturers must issue warrants that their regulated products comply with Federal standards at the time of sale. They are also required to maintain records and provide information, including production samples, if requested by EPA.

The EPA Administrator also is to prescribe noise-emission standards for the operation of *equipment* and *facilities* of *interstate railroads, trucks,* and *buses.*

All Federal agencies are directed to use the full extent of their authority to insure that purchasing and operating procedures conform to the intent of the law. EPA may certify low-noise emission products for purchase by the Federal government.

Aircraft Noise

Under the Noise Control Act of 1972, the EPA Administrator is required by mid-1973 to make a comprehensive study of aircraft noise and cumulative noise exposure around airports. Using this information, EPA is to submit to the FAA proposed regulations to control aircraft noise and sonic booms. After a hearing and further consultation with EPA, the FAA may adopt or modify the proposed regulations. The FAA may reject the proposals if it believes they are unsafe, technologically or economically infeasible, or not applicable to certain aircraft. However, it must publicly explain its specific reasons for rejection. A continuing review and consultation role is provided for EPA.

An End to Noise Pollution

This comprehensive nature of the Noise Control Act of 1972 brings under Federal regulation for the first time, nearly all of the major new sources of noise. An incentive now exists for the full employment of noise-control technology that is already available, and the day when quiet is restored appears closer. We know how to build quieter. Now the law is to give the nation the stimulation to do it.

TRANSPORTATION AND ENERGY CONSERVATION*

Transportation is a high-energy function. Approximately 60 percent of the liquid fuel consumed in the United States is used for transportation purposes.

Within the transportation sector, highway vehicles are the major consumer, accounting for nearly 40 percent of all the petroleum used in the United States.

1974 GASOLINE CONSUMPTION

Vehicles		*Barrels/day*
Passenger cars		
Getting to work		1,760,000
Pleasure driving		1,360,000
Personal business		1,020,000
Business, government		800,000
	Subtotal	4,940,000
Trucks		1,470,000
Farm vehicles		200,000
Other uses		200,000
	Total	6,810,000

Transportation's petroleum requirements *doubled* between 1954 and 1974.

Ninety-two percent of the more than 2.4 trillion "person miles" of travel annually in the United States are by automobile.

Seventy percent of all travel in the United States is by automobile; 27.6 percent by commercial air transportation; 1.5 percent by bus, and 0.5 percent by passenger rail.

Motor vehicles, therefore, are of paramount significance in U.S. fuel conservation efforts, because they are the predominant users.

In 1970 oil imports cost the United States $2.7 billion. In 1974 the U.S. paid *$23.6 billion* for the oil needed to bridge the difference between domestic production and nationwide demand.

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*This reading has been adapted from a U.S. Department of Transportation Fact Sheet of June 10, 1975.

From the days of oil surpluses in the 1960's, the United States has moved to a dependency situation. In 1974 imports were needed to supply 37 percent of our petroleum needs; unless conservation, energy conversion, and energy efficiency efforts succeed, U.S. dependency on foreign oil could rise to 50 percent by 1980.

While estimates of undiscovered oil reserves vary greatly, the known recoverable reserves of U.S. oil are reported to be 45 billion barrels. In view of contemporary consumption rates, limited reserves, and declining domestic production, petroleum independence is not attainable as a short-term goal.

Fuel conservation is essential for economic as well as for supply reasons. The motor vehicle, as the major user (about 45 percent of the petroleum used annually in the U.S.), is potentially the greatest saver--especially in view of the vast quantities of fuel wasted through carelessness, inefficiency, unnecessary driving, and driving at higher speeds than necessary.

How the 55 mph Speed Limit Saves Fuel

The nation's 105 million automobiles, 26 million trucks, and 400,000 buses consume about 75 percent of the petroleum used for transportation purposes in the United States, nearly 107 billion gallons in 1974.

The government has challenged the auto industry to achieve a 40 percent improvement in fuel efficiency by 1979, to an average passenger car performance of nearly 20 miles per gallon.

Tests by the Federal Highway Administration* show improvements in automobile fuel economy ranging from 11.8 to 28.5 percent by driving at 55 mph rather than 70 mph, depending on the size of the car.

COMPARATIVE CONSUMPTION RATES

Miles/hour	*Subcompact*	*Compact*	*Standard*	*Luxury*
30	31.45 mpg	21.33 mpg	20.33 mpg	18.33 mpg
40	35.19	21.33	20.00	19.28
50	33.05	18.94	17.50	15.62
55	31.91	18.17	16.84	14.92
60	30.78	17.40	16.17	14.22
70	22.82	15.36	14.86	12.74

*"Effects of Speed on Automobile Gasoline Consumption Rates," a Federal Highway Administration mileage study. Copies available on request from the FHWA, Washington, D.C. 20590, Attention: HPA-1.

About half of all vehicle miles are driven under conditions where speeds above 55 mph are possible. The potential savings if 90 percent of the driving population comply with the 55 mph speed limit are estimated at 200,000 barrels of gasoline per day--20 percent of the total savings advocated by President Ford for 1975.

Average interstate speeds declined 7.5 mph in 1974. Surveys show that only 6 percent of highway vehicles exceeded 65 mph in 1974, compared to 31 percent in 1973. An important part of the 3.4 percent reduction in gasoline consumption in 1974 was due to lower speeds.

BIBLIOGRAPHY

The bibliography contains educational materials for teachers and students. It contains several types of readings:

- Student materials (pamphlets, books), many of which also can profitably be read by teachers
- Background materials for teachers on transportation and the environment
- Relevant periodicals

The individual entries in the teacher and student sections are presented in the following format:

**76. *Title of Work*, author, date of publication. Number of pages or list of materials. Price.	
Type of Material	Description of material with evaluation of its quality and relevance for transportation and the environment education.
	Source from which material may be obtained.*

For purposes of convenience, the teacher and student materials have been rated by stars next to the material description (see sample above). The stars represent the following evaluation:

no stars	material is useful, but fair
(*) one star:	material is good
(**) two stars:	material is very good
(***) three stars:	material is excellent

It should be kept in mind that these evaluations are an estimation of the material's *quality and relevance*.** As such, the absence or low rating of teaching material indicate that the material itself is poor. It may be excellent but simply not very relevant. In addition, any absences may be due to the authors' oversight.

At the end of the bibliography is a list of government agencies that can be contacted for further information about transportation and the environment.

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* Allow ten weeks for delivery of items ordered from the U.S. Government Printing Office.

**A complete discussion of the criteria used to evaluate the materials may be found at the end of the Manual.

STUDENT MATERIALS

*1. *Needed: Clean Air; The Facts About Air Pollution,* 1972. 15 pages. 25¢.

Pamphlet Useful but very sketchy overview of the effects of air pollution on health, energy depletion, and economic costs. Transportation is included as one of the sources of pollution. Some students may find the cartoon format condescending or childish.

Channing L. Bete Co., Inc.
45 Federal Street
Greenfield, Massachusetts 01301

*2. *Vanishing Air,* by John C. Esposito, 1970. 328 pages. 95¢.

Book Highly critical account of government's attempt to regulate air pollution and industry's alleged attempts to avoid self-regulation. Chapter 1 on general causes and effects of air pollution and section of Chapter 6 on air pollution from airplanes are relevant and informative. Major attention is paid to automobile pollution; author blames the government for not enforcing strict standards and the industry for not taking actions of its own and attempting to avoid Federal and state controls.

Grossman Publishers
125A East 19th Street
New York, New York 10003

*3. *Air Pollution: The World's Exhaust,* 1971. 62 pages. $1.00

Book Overview of the air pollution problem, with discussions of smog, what air pollution is, automobile pollution, health effects, effects on the weather, and who should be responsible for preventing air pollution. Approach is to raise questions rather than present solutions.

Pendulum Press, Inc.
The Academic Building
Saw Mill Road
West Haven, Connecticut 06516

**4. *Health Effects of Environmental Pollution,* 1973. 20 pages. 30¢.

Pamphlet Highly useful overview of the effects of air, water, and noise pollution on human health.

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

**5. *Automotive Fuels and Air Pollution,* 1971. 32 pages. 40¢.

Pamphlet Detailed account, for the layman, of automobile pollutants, their effects, and what can be done to eliminate or reduce them.

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

6. *Air Pollution Primer,* 1969. Price varies.

Pamphlet Handbook that explains air pollution's processes, sources, characteristics, and effects. Special sections on weather and radioactivity.

Available from local
Tuberculosis Asssociation

7. *Air Pollution Workbook,* 1970. $1.00.

Pamphlet Concise explanations of the atmosphere, characteristics of specific pollutants, biological effects of pollution; bibliography and references.

Scientific Institute for Public Information
30 East 68th Street
New York, New York 10021

8. *Transportation Noise and Its Control,* 1972. 27 pages. 70¢.

Pamphlet Informative, not too technical discussion of the nature of noise pollution, the decibel unit of measurements, the extent of noise caused by cars, trucks, planes, and rapid transit, and possibilities for reducing or eliminating transportation noises.

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402
Stock Number 50000-0057

**9. *Transportation Noise Pollution: Control and Abatement,* 1970. 190 pages. $6.00.

Pamphlet Very informative, in places technical, discussion of the causes of transportation noise pollution and what can be done about them. Excellent charts, graphs, and cartoons.

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22151
Stock Number N71-15557

10. *Noise and You*, 1970. 15 pages. 25¢.

Pamphlet — Brief overview of the nature of noise and the dangers of too much and too loud noise. Not tied in specifically with transportation noise. Informative, but in a cartoon format that some students may find condescending or childish.

Channing L. Bete Co., Inc.
45 Federal Street
Greenfield, Massachusetts 03101

*11. *Noise Pollution*, 1972. 13 pages. 35¢.

Pamphlet — Informative discussion of what sound is, how it affects our health, and general ideas for solutions. Noises from transportation sources are discussed.

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402
Stock Number 5500-0072

*12. *The Noise Control Act of 1972: Highlights*, 1973. 4 pages. Free.

Flyer — Brief, useful overview of the law's major provisions, with paragraphs on the effects of noise, some common noisemakers, and citizen suits.

Office of Public Affairs
U.S. Environmental Protection Agency
Waterside Mall
Washington, D.C. 20460

13. *Aircraft and Air Pollution: Selected Readings*, 1971. 61 pages. Price not listed.

Bibliography — Bibliography of papers, reports, and periodical articles on environmental pollution caused by airplanes.

Department of Transportation
Office of Administrative Operations
Library Services Division
400 7th Street, S.W.
Washington, D.C. 20590

**14. *Aircraft and the Environment*, 1973. 13 pages. Free.

Pamphlet Detailed description of the positive effects airplanes have on the environment, from crop spraying to fire fighting. Indispensable supplement to other accounts of airplanes' harmful effects on the environment.

Federal Aviation Administration
Aviation Education Program Division A6A 300
Office of General Aviation Affairs
Washington, D.C. 20591

*15. *Cost of Air Pollution Damage: A Status Report*, 1973. 73 pages. $2.50.

Pamphlet A review of studies on the cost of air pollution damage on human health, vegetation, materials, and residential property values. Transportation pollution is not singled out. Very analytical.

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22151
Stock Number PB-222 040

16. *Aviation and the Environment*, 1971. 19 pages. Free.

Bibliography Bibliographical references for materials on aviation's response to improving the environment. Explores in some detail the relationship between airplanes and the environment. List is admittedly pro-airplane manufacturers.

Department of Transportation
Federal Aviation Administration
800 Independence Avenue
Washington, D.C. 20591
Stock Number GA-300-89

17. *Airport Problems: Access and Air Traffic Congestion: Selected Readings*, 1971. 34 pages. Price not listed.

Bibliography Bibliography of articles, reports, and papers on airport access and air traffic delays. Both technical and nontechnical studies are listed.

Department of Transportation
Office of Administrative Operations
Library Services Division
400 7th Street, S.W.
Washington, D.C. 20590

*18. *Railroads and the Environment in Rail Freight Operations*, 1972. 28 pages. 30¢.

Pamphlet Concise, informative discussion of railroad pollution and abatement, including odors, engine exhaust emissions, sanitary waste control, noise, and land use. Photographs.

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

**19. *Unsafe at Any Speed*, by Ralph Nader, revised edition, 1973. 367 pages. $1.95, paperback.

Book New edition of now classic study of car industry's alleged lack of attention to safety. Chapter 4, "The Power to Pollute," attributes the failure to control automobile pollution to industry delays, collusion, and miserliness. Book as a whole is indispensable for this view toward responsibility for pollution and efforts to control it, even though most of book is about automobile safety.

Bantam Books Inc.
666 5th Avenue
New York, New York 10022

20. *Rethinking Your Automobile*, 1973. 6 pages. Free.

Flyer Brief discussion of consumer's role in reducing use of cars in view of the energy shortage.

Office of Public Affairs
U.S. Environmental Protection Agency
Waterside Mall
Washington, D.C. 20460

***21. *Getting Around: People and the City*, 1974. 48 pages. $1.29.

Pamphlet Informative, thought-provoking case studies and discussions on urban transportation, including commuting, rapid transit, citizen action, dial-a-bus, mass transit, banning cars, and the Bay Area Rapid Transit (BART) in San Francisco. Discussion questions are provided. Well illustrated; photographs.

Scott, Foresman and Company
1900 Eastlake Street
Glenview, Illinois 60025

**22. *Highways and Our Environment*, by John Robinson, 1971. 332 pages. $24.00.

Book — Well written, highly informative, and impassioned account of how highways and the automobiles they serve have blighted the environment with litter, concrete, air and noise pollution, and visual unsightliness. Chapters on citizen action and the highway establishment are very useful. One appendix lists citizen action groups and government agencies involved in transportation and the environment. A profusion of valuable photographs makes the work unique.

McGraw-Hill Book Company
1221 Avenue of the Americas
New York, New York 10020

23. *Superhighway--Superhoax*, by Helen Leavitt, 1970. 95¢. (Not evaluated.)

Paperback — A polemic with facts about Federal highway programs, funding and operations; cites problems and issues in localities throughout the U.S.; special chapter on urban highway problems; information on alternative transit systems.

Ballantine Books, Inc.
201 E. 50th Street
New York, New York 10022

24. *Junkyard Control: Highway Beautification Act of 1965*, 1967. 15 pages. Free.

Pamphlet — Two-page description of provisions of the act as they affect junkyard control. Other pages provide before and after photographs of junkyards with and without adequate screening from highway viewing.

U.S. Department of Transportation
Federal Highway Administration
Bureau of Public Roads
400 7th and D Streets, S.W.
Washington, D.C. 20590

25. *Benefits of Interstate Highways*, 1970. 28 pages.

Pamphlet — Report to Congress describing user, economic, and community benefits deriving from interstate highway construction.

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

26. *Urban Parks and Roads*, by Douglas C. Smith, 1971. 54 pages. $1.50, paperback. (Not evaluated.)

Book

Highway Users Federation for Safety and Mobility
1776 Massachusetts Avenue, N.W.
Washington, D.C. 20036

*27. *Park and Recreational Facilities: Their Consideration As An Environmental Factor Influencing the Location and Design of a Highway*, 1971. 47 pages. 45¢.

Pamphlet

Informative discussion of what criteria should be considered when building a highway to protect playgrounds, parks, and parkways.

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

**28. *Community Involvement in Highway Planning and Design*, 1973. 53 pages. Price not listed.

Conference Proceedings

Conference proceedings with informative discussion on the adequacy of public hearings, the characteristics of an effective prehearing community-involvement program, and what actions can be taken to achieve early and effective public involvement.

U.S. Department of Transportation
Federal Highway Administration
Office of Environmental Policy
400 7th Street, S.W.
Washington, D.C. 20590

*29. *Community Participation in Highway Planning*, 1972. 59 pages. Price not listed.

Report

Recommendations to the Department of Transportation on how to promote citizen participation in highway planning efforts. Also discusses such issues as how citizens can become motivated to participate in planning and how one can find representative, indigenous leaders who will represent a community in the planning process.

U.S. Department of Transportation
Office of Consumer Affairs
400 7th Street, S.W.
Washington, D.C. 20590

30. *Government Approaches to Automobile Air Pollution Control*, 1971. $3.00. (Not evaluated.)

Pamphlet Discusses industry's control of auto emissions, consumer control, and advantages and disadvantages of standard-setting and traffic system designs.

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22151
Publication No. PB203-952

31. *An Anti-pollution Program: Natural Gas Powered Vehicles*, 1972. 6 pages. Free.

Pamphlet Report on dual-fuel system in cars enabling them to operate on either natural gas or gasoline. Clean-burning properties of natural gas are explained. Well illustrated.

General Services Administration
18th and F Streets
Washington, D.C. 20405

***32. *A Citizen's Guide to Clean Air*, 1972. 95 pages. Free.

Pamphlet An extremely useful, detailed account of the clean air laws and how citizens can advocate and plan for the control of air pollution. One chapter deals with auto emission controls, another with the citizen's legal rights, and a third with the citizen's role in policy making.

The Conservation Foundation
1717 Massachusetts Avenue, N.W.
Washington, D.C. 20036

**33. *The Campaign for Cleaner Air*, by Marvin Zeldin, 1973. 28 pages. 35¢.

Pamphlet Informative, factual account on clean air, including the Clean Air Act, implementing the law, controlling automobile pollution, and the citizen's role.

Public Affairs Pamphlets
381 Park Ave. South
New York, New York 10016
Pamphlet No. 494

34. *Action for Clean Air: A Manual for Citizen Participation in State Implementation Plan Proceedings Under The Clean Air Amendments of 1970*, 1971. Price not listed. (Not evaluated.)

Pamphlet Explains in detail the Act and regulations for implementation plans; makes specific suggestions for action by individuals and by organized citizen groups. Emphasizes legal procedures and citizens' legal rights.

Natural Resources Defense Council
36 West 44th Street
New York, New York 10036

*35. *More Fun Per Gallon: A Guide to Fuel Conservation with an Outboard Powered Boat*, 1973. 16 pages. Free.

Pamphlet Useful tips on how to conserve gasoline while motorboating.

More Fun Per Gallon
Marketing Communications Department
Johnson Outboards
200 Sea-Horse Drive
Waukegan, Illinois 60085

*36. *A Citizen's Guide to Clean Water*, 1973. 95 pages. Free.

Pamphlet An extremely useful, detailed account of the clean water laws and how citizens can advocate and plan for the control of water pollution. However, laws and pamphlet deal primarily with pollution from industrial sources, rather than transportation facilities.

Office of Public Affairs
U.S. Environmental Protection Agency
Waterside Mall
Washington, D.C. 20460

**37. *Process Guidelines: The Action Plan*, 1972. 9 pages. Free.

Flyer Brief discussion of state action plans under which states must consider economic, social and environmental factors when planning highway construction.

U.S. Department of Transportation
Federal Highway Administration
Office of Environmental Policy
400 7th Street, S.W.
Washington, D.C. 20590

*38. *Replacement of State and Local Publicly Owned Facilities Acquired For Federal-Aid Highways*, 1974. 10 pages. Free.

Flyer Brief description of Federal laws which permit Federal participation in the costs of acquiring substitute sites for facilities displaced by highway construction. Includes examples of building replacement assisted by Federal funds.

U.S. Department of Transportation
Federal Highway Administration
400 7th and D Streets, S.W.
Washington, D.C. 20590

**39. *Your Rights and Benefits as a Highway Relocatee Under the Federal Relocation Assistance Program*, 1974. 54 pages. Free.

Pamphlet Discusses possible reimbursement for moving costs and obtaining comparable replacement housing for both homeowners, renters, businessmen and -women, and farmers.

U.S. Department of Transportation
Federal Highway Administration
Office of Right-of-Way
400 7th and D Streets, S.W.
Washington, D.C. 20590

***40. *Rites of Way: The Politics of Transportation in Boston and the U.S. City*, by Alan Lupo, Frank Colcord, and Edmund P. Fowler, 1971. 294 pages. $3.95, paperback.

Book Detailed account of how community opposition in metropolitan Boston forced the state and local governments and quasiindependent commissions to abandon plans to construct freeways in and around the city. Book also discusses who makes transportation decisions in other major U.S. cities and the politics of such decisions. Excellent examples of citizen action seeking to alter the environmental effects of transportation decisions on population displacement, traffic congestion, land use, and esthetics.

Little, Brown and Company
34 Beacon Street
Boston, Massachusetts

**41. *Ecotactics: A Sierra Club Handbook for Environment Activists*, 1970. 287 pages. 95¢, paperback.

Book Information essays on the nature of several different aspects of the environmental crisis, including transportation's effects on the environment. Especially useful for descriptions of methods by which citizens can individually and collectively work to reduce

pollution. Many readers, however, will find some of the tactics beyond their ability, energy, or interest, and inappropriate on ethical grounds. Many tactics described with reference to industrial pollution are equally applicable to pollution caused by transportation. Appendices list books, environmental groups and societies, and key federal agencies of relevance to activists.

Pocket Books
630 Fifth Avenue
New York, New York 10020

**42. *Action for Environmental Quality*, 1973. 21 pages. Free.

Pamphlet Discussion of standards and enforcement measures for air and water pollution.

Office of Public Affairs
U.S. Environmental Protection Agency
Waterside Mall
Washington, D.C. 20460

**43. *Don't Leave It All to the Experts: The Citizen's Role in Environmental Decision Making*, 1972. 19 pages. Free.

Pamphlet Identification of methods by which citizens can protect the environment, including becoming informed, knowing the law, lobbying, fighting for funds, and knowing your rights.

Office of Public Affairs
U.S. Environmental Protection Agency
Waterside Mall
Washington, D.C. 20460

*44. *Citizen Action Can Get Results*, 1972. 20¢.

Pamphlet Three somewhat superficial case studies of how community political action successfully reduced environmental pollution. One case study on air pollution indirectly involves auto pollution. However, the case studies are useful as examples of citizen action, even though they are not directly related to transportation's environmental effects.

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

45. *The Federal-Aid Highway Program,* 1975. 7 pages. Free.

Flyer Brief description of the nature of the Federal government's aid to states for highway construction, including mention of how citizens can influence highway decisions, laws providing compensation for persons displaced by highway construction, and laws to protect the environment.

U.S. Department of Transportation
Federal Highway Administration
400 7th and D Streets, S.W.
Washington, D.C. 20590

*46. *Citizen Participation in Transportation Planning,* 1973. 142 pages. $5.00.

Booklet Papers from a conference on the Boston Transportation Planning Review which consider issues of citizen participation well beyond the Boston experience. Papers include discussion of the politics of transportation planning, nonwhite viewpoints, rural citizen involvement, and ecological concerns in transportation planning.

Highway Research Board
National Academy of Sciences
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

*47. *Protecting the Environment in the Federal-Aid Highway Program,* 1976. 7 pages. Single copies free.

Flyer Identifies legislation designed to protect the environment from harmful effects of highways, discusses the role of the Federal Highway Administration in carrying out these laws, and suggests how the public can become involved in the effort to protect the environment.

U.S. Department of Transportation
Federal Highway Administration
400 7th and D Streets, S.W.
Washington, D.C. 20590

*48. *In Productive Harmony: Environmental Impact Statements Broaden the Nation's Perspectives,* 1972. 13 pages. Single copies free.

Pamphlet Describe the provisions of the National Environmental Policy Act of 1970 and the nature of an environmental impact statement, including the Environmental Protection Agency's role in a statement's development.

U.S. Environmental Protection Agency
Office of Public Affairs
Washington, D.C. 20460

***49. *Getting Involved in Transportation*, 1976. 12 pages. Single copies free.

Pamphlet — Describes the nature of environmental impact statements and offers specific suggestions for how the public can become involved in their formulation and in transportation planning in general.

U.S. Department of Transportation
Office of the Secretary
Office of Environment, Safety & Consumer Affairs
400 7th and D Streets, S.W.
Washington, D.C. 20590

**50. *Readings for the Eco-activist*, 1972. 41 pages. Price not listed.

Bibliography — A bibliography of environmental publications of the Federal government for young persons interested in involvement in environmental problems. There are chapters on air, water, and noise pollution that include materials on transportation pollution.

Division of Information Services
Office of Library Services
U.S. Department of the Interior
Washington, D.C. 20240

**51. *Groups that Can Help: A Directory of Environmental Organizations*, 1972. 12 pages. Free.

Directory — Extremely useful listing of organizations that can be contacted by individuals seeking information and advice on environmental problems, including problems created by transportation.

U.S. Environmental Protection Agency
Office of Public Affairs
Waterside Mall
Washington, D.C. 20460

*52. *Your Right to Government Information: How to Use the FOIA*, 1975. 23 pages. Free.

Flyer — Detailed discussion describing citizens' rights under the Freedom of Information Act of 1966, which provides that records of Federal government agencies shall be made available to members of the public and outlines the procedures by which private citizens may secure these records.

American Civil Liberties Union
22 East 40 Street
New York, New York 10016
or local chapter

53. Single free copies of the following materials, which have not been evaluated, are available from Public Affairs, Federal Assorted Highway Administration, U.S. Department of Transportation, Washington, D.C. 20590.

Cost of Owning and Operating an Automobile

Are We Running Out of Gas?

Car Pool and Bus Pool--Matching Guides

The Effect of Speed on Automobile Gasoline Consumption Rates.

BACKGROUND LITERATURE FOR TEACHERS ON TRANSPORTATION AND THE ENVIRONMENT

Most instructors who plan to teach a unit on transportation and the environment will need to do some preliminary reading in the field in order to teach effectively. However, an encyclopedic knowledge of the facts is not necessary to teach this subject effectively. You do not need to be an expert, for example, on the chemical nature of automobile exhaust pollution. The more students learn about transportation and the environment through their own efforts, the more likely they are to retain their knowledge and skills and be able and motivated to put them to work.

To gain a working background about transportation and the environment we suggest three steps:

- Read Chapter III, "Readings on Transportation and the Environment."
- Read all the lecture activities; they present in outline form most of the information you will need to know.
- Purchase or obtain from the library one (or more) of the books listed below and read it, skimming the sections whose technical level or detail exceed your interest level and needs. *You can also read with profit all of the items listed above under "Student Materials."*

*1. *The Tyranny of Noise*, by Robert Alex Baron, 1970. 294 pages. $7.50.

Book — Comprehensive account of causes of noise pollution, price in terms of health, dollars, and environment quality, political aspects of noise pollution control, and citizen actions to promote noise abatement. Section on citizen actions is detailed and very useful, but somewhat idealistic.

St. Martin's Press, Inc.
175 Fifth Avenue
New York, New York 10010

2. *Noise: The Unseen Enemy*, 1972. 63 pages. $1.00.

Book — Overview of the noise pollution problem, with discussions of what sound is, physical and psychological effects, and supersonic aircraft noise. Well illustrated, but little of booklet deals with transportation noise pollution per se.

Pendulum Press, Inc.
The Academic Building
Saw Mill Road
West Haven, Connecticut 06516

**3. *Dead End: The Automobile in Mass Transportation*, 1972. 231 pages. $1.45.

Book — Comprehensive discussion of role of automobile in contemporary American life and detrimental effects it has had. Included are discussions of the energy problem, air pollution, freeways, and alternatives to the automobile.

Penguin Books Inc.
7110 Ambassador Road
Baltimore, Maryland 21207

4. *The Freeway in the City*, 1968. 141 pages. $3.00.

Book — Somewhat technical discussion of the principles of urban freeway planning and design that considers environmental concerns in terms of the view from the freeway, location of the freeway, and highway structures. Well illustrated.

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

*5. *The Accessible City*, by Wilfred Owen, 1972. 150 pages. $2.95.

Book — General discussion of big city transportation problems, with emphasis on rational planning to avoid problems. Chapter on Public Transport provides useful background information on one alternative to the automobile. Sections on transportation planning consider environmental concerns of land use and esthetics.

The Brookings Institute
1775 Massachusetts Avenue
Washington, D.C. 20036

*6. *The Voice of the Transportation Consumer: Executive Summary*, 1975. 108 pages. $5.25.

Pamphlet/ report — This is a comprehensive and forthright "Report to the Secretary of Transportation on Nationwide Consumer Public Hearings Conducted by the (Department of Transportation) Office of Consumer Affairs during 1971-1974." Presents in summary but highly readable fashion the results of 54 hearings conducted in 34 cities and towns. The report analyzes 1280 complete questionnaires received at the hearings. The report covers all aspects of transportation, but indirectly treats transportation and the environment. A full report of the hearing results is also available and runs to 656 pages.

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22151
Catalog No. PB 241764

PERIODICALS

In addition to the periodicals listed below, teachers and students can also consult in libraries the *Reader's Guide to Periodical Literature* for past articles on public transportation.

Changing Times
The Kiplinger Magazine
Editors Park, Maryland 20782

Consumer News
Federal Office of Consumer Affairs
Superintendent of Documents
U.S. GPO
Washington, D.C. 20402

Consumer Reports
Consumer's Union
256 Washington Street
Mt. Vernon, New York 10550

Environment Action Bulletin
33 East Minor Street
Emmaus, Pennsylvania

Highway and Urban Mass Transportation
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

IRT Newsletter
Institute for Rapid Transit
Suite 508, 1612 K Street, N.W.
Washington, D.C. 20006

Mass Transit
538 National Press Building
Washington, D.C. 20045

Newsletter of the American Council on Consumer Interests
238 Stanley Hall
University of Missouri
Columbia, Missouri 65201

Of Consuming Interest
Federal State Reports
P.O. Box 986
Arlington, Virginia 22216

Transit Journal
The American Public Transit Association
1100 17th Street, N.W.
Washington, D.C. 20036

Transpo Topics for Consumers
Department of Transportation
Office of the Secretary
Washington, D.C. 20590

Transportation U.S.A.
U.S. Department of Transportation
Office of Public Affairs
400 7th and D Streets, S.W.
Washington, D.C. 20590

GOVERNMENT INFORMATION AGENCIES

For further information about transportation consumer issues, citizens can contact the appropriate U.S. Department of Transportation or other government agencies listed below:

Agency Name and Address	*Telephone Number*
U.S. Department of Transportation 400 Seventh Street, S.W. Washington, D.C. 20590	Office of Public Affairs 202/426-4321
Office of the Secretary of Transportation Office of Consumer Affairs	202/426-4520
Federal Highway Administration (address above)	Public Affairs 202/426-0648
Urban Mass Transportation Administration (address above)	Public Affairs 202/426-4043
Environmental Protection Agency 404 M Street, S.W. Washington, D.C. 20460	Public Information 202/755-0890

BIBLIOGRAPHY EVALUATION CRITERIA

All teacher and student materials that were located were evaluated along two dimensions: *quality* and *relevance*. Quality was defined to include the following components:

- Provision of creative and detailed classroom activities or learning experiences that go beyond the one- or two-sentence "have the students do *x*, *y*, *z*" suggestions
- Development of decision-making skills that may be transferable to other consumer issues
- Attention to affective educational approaches and objectives, not merely cognitive ones
- Emphasis on student initiative and involvement in classroom activities and in the planning of those activities
- Concentration on student concerns
- Clear presentation that allows teachers to develop additional activities and units of their own
- A modular, flexible approach that enables teachers to develop activities and units tailored to the needs of their particular students and community
- Accurate factual information
- A nonmoralistic, noninjunctive approach
- Stress on the needs and problems of minority groups
- An interdisciplinary approach to consumer education

Few curriculum materials combined all these quality ingredients. Many included none or only a few. In some borderline cases where the teaching material contained some quality ingredients, the authors made a subjective evaluation on whether the material contained enough of these elements to warrant referencing in the module.

To be considered relevant, a teaching material had to deal in a significant way with transportation and the environment from the point of view of, or useful to, a consumer. Teaching materials were excluded from the module when their relevance was extremely limited or nonexistent, i.e.:

- Only a small section of the material dealt with issues relevant to transportation and the environment. However, such materials were included when a subsection was of high caliber, dealth with an important aspect of transportation and the environment not covered elsewhere, or was part of an easily accessible and inexpensive unit.

- The material was extremely specific--it dealt with too narrow an aspect of an issue to be useful to teachers or students except in highly specialized courses or units.

- The material was designed for a highly specialized audience.

- The material was oriented strictly toward career education.

- The material was outdated.

- The material contained information that applied primarily or significantly to a local situation.

- The material was not distributed out of state.

SPIRIT MASTER #1: FOR USE WITH ACTIVITIES #4 AND #19

PROBLEM SITUATION CARDS

You live on Pleasant Street, once a quiet, two-lane, tree-lined street in the suburbs. Pleasant Street has just been designated a truck route by the town because it connects two main highways, Routes 2 and 65. Now huge trailer trucks drive down the street from dinner time to early morning. You are afraid to let your children play outside after dinner, and at night the noise is unbearable. You have trouble hearing the TV, and your house shakes from the rumbling. What's your solution?	Your neighbors are planting two trees which will make it difficult for cars to see your children when they play in the street. What's your solution?
You swim in a lake that has suddenly been invaded by a group of kids who use their motorboats late at night and make a terrible racket. What's your solution?	You live near the airport. The noise of planes taking off and landing every two minutes is deafening: it's difficult for you to have conversations during dinner or to hear the TV. And at night, the noise keeps your children from sleeping soundly. What's your solution?
The state is planning to build a highway through your town which will cut across your property and damage the view from your front windows. The Highway Department has agreed to pay you for the property they take, but not for any damage to your scenic view. What is your solution?	You work in the city and it's not easy to get another job these days. But about once or twice a month there is so much pollution in the air that your eyes water and you cough badly. You also get very nervous and upset driving home in the rush hour traffic and then are irritable with your family for the rest of the evening. What's your solution?
You live next door to the fire station. At all hours of the day and night the engines come out with their sirens wailing, often waking you up several times during the night. What's your solution?	There's a confusing directional sign in the fork in the road down the street which drivers see too late and so pull out of lane abruptly to change direction at the last moment. This is on your route to work, and you've nearly been hit twice by other cars. What's your solution?

SOLUTION CARDS

SPIRIT MASTER #2: FOR USE WITH ACTIVITIES #4 AND #19

SOLUTION CARDS

Personally talk to the person, group, or business responsible for your problem.	Find other people who have a similar problem and organize a group to take action. Describe what action you would propose.
Avoid the problem by a. Moving away b. Covering your ears c. Changing your place of work or recreation d. Driving a different route e. Other action (say what kind) (Pick only one solution)	Do nothing: You have no right to take action. (Why not?)
Find out if any laws are designed to solve the problem and initiate legal action a. To stop the activity b. To get money (compensation) (Pick one or more purposes for the legal action)	Do nothing: the problem can't be solved. (Why not?)
Have a petition signed and present it to the responsible politician, agency, neighbor, or company. Describe what the petition would say.	Any other realistic solution of your own choosing.

SOLUTION CARDS

SPIRIT MASTER #3: FOR USE WITH ACTIVITIES #4 AND #19

Score Sheet for Solution Game

Give players one to five points for *each* type of rating according to the following scoring scheme:

Poor:	1
Below average:	2
Average:	3
Good:	4
Excellent:	5

Player:_____		Player:_____	
PRACTICALITY SCORE:	____	PRACTICALITY SCORE:	____
EFFECTIVENESS SCORE:	____	EFFECTIVENESS SCORE:	____
JUSTIFICATION SCORE:	____	JUSTIFICATION SCORE:	____
TOTAL SCORE:	____	TOTAL SCORE:	____

Player:_____		Player:_____	
PRACTICALITY SCORE:	____	PRACTICALITY SCORE:	____
EFFECTIVENESS SCORE:	____	EFFECTIVENESS SCORE:	____
JUSTIFICATION SCORE:	____	JUSTIFICATION SCORE:	____
TOTAL SCORE:	____	TOTAL SCORE:	____

Player:_____		Player:_____	
PRACTICALITY SCORE:	____	PRACTICALITY SCORE:	____
EFFECTIVENESS SCORE:	____	EFFECTIVENESS SCORE:	____
JUSTIFICATION SCORE:	____	JUSTIFICATION SCORE:	____
TOTAL SCORE:	____	TOTAL SCORE:	____

Player:_____		Player:_____	
PRACTICALITY SCORE:	____	PRACTICALITY SCORE:	____
EFFECTIVENESS SCORE:	____	EFFECTIVENESS SCORE:	____
JUSTIFICATION SCORE:	____	JUSTIFICATION SCORE:	____
TOTAL SCORE:	____	TOTAL SCORE:	____

Player:_____		Player:_____	
PRACTICALITY SCORE:	____	PRACTICALITY SCORE:	____
EFFECTIVENESS SCORE:	____	EFFECTIVENESS SCORE:	____
JUSTIFICATION SCORE:	____	JUSTIFICATION SCORE:	____
TOTAL SCORE:	____	TOTAL SCORE:	____

Player:_____		Player:_____	
PRACTICALITY SCORE:	____	PRACTICALITY SCORE:	____
EFFECTIVENESS SCORE:	____	EFFECTIVENESS SCORE:	____
JUSTIFICATION SCORE:	____	JUSTIFICATION SCORE:	____
TOTAL SCORE:	____	TOTAL SCORE:	____

SPIRIT MASTER #4: FOR USE WITH ACTIVITIES #4 AND #19

Directions

1. First time the game is played, players paste the two pages of cards onto cardboard or other solid backing material and then cut out the cards. Each group of players should have a page or set of solution cards for each player and two pages or sets of problem cards for the entire group.
2. Shuffle the problem cards and leave them face down in a pile.
3. Each player should have a complete set of eight solution cards.
4. Each player carefully reads all his solution cards.
5. Players match fingers to see who goes first.
6. First player takes the top problem card and reads it aloud. The player whose turn it is is known as the *problem solver*. He then has two minutes in which to decide which of his solution cards he will apply to the problem he faces. He may use each solution card only *once*. He may use only one solution card each turn. After he has used a solution card and his turn is over, he must discard it.
7. When the player has decided which solution card to apply to the problem he faces, he has three minutes in which to explain to the other members of his group

   a. The nature of the problem he faces
   b. *Exactly* what he would do
   c. Why he feels he has a right to take action
   d. Why he thinks his solution would solve his problem

   If a player uses his "Do noting" solution card or the "No right to take action" card, he must explain *why* he thinks there is no solution to the problem or *why* he feels he is not entitled to take action.
8. After explaining his solution for three minutes, any player in the group may ask the problem solver one question about his solution. The problem solver may take one minute to answer each question.
9. When the problem solver has answered each question, each of the other players fills out a *score sheet*, rating the problem solver's solution on the basis of practicality/feasibility (could the solution actually be carried out?), effectiveness (would the solution actually solve the problem?), and justification (does he have the right to take action?).
10. Play proceeds clockwise until every player has had three turns or until a period of time decided on in advance by the teacher or players has passed.
11. Player with greatest number of points at end of game is winner. (*Option:* Totals for each of the three scoring categories can be totaled separately for each player to see if some players scored consistently high or low in one particularly category. For example, a player may score high on effectiveness and low on ethics.)

Summary of Order of Play

1.	Pick a problem card	
2.	Decide on which solution to use	2 minutes
3.	Explain the solution to group	3 minutes
4.	Answer questions by group	3-5 minutes
5.	Fill in the score sheet	2 minutes

Approximate time for each turn: 13-15 minutes.

SPIRIT MASTER #5: FOR USE WITH ACTIVITIES #6, #20, #27 AND #29

Sample Scenarios

Louis Spontini and his family live near a large city airport. Airplanes carrying cargo land at all hours of the night and make it difficult for him to sleep. A new group has just been formed to force the airport to shut down between 11:00 p.m. and 6:00 a.m. and Mr. Spontini is thinking of joining the group.

However, business people in the city say that if the airport closes down during the night, many businesses won't be able to get their goods on time or in good condition. Trains, buses, and trucks either take too long or are too expensive. These business people say they might have to close down if the airport is closed at night. This would mean many people would lose their jobs.

Should Mr. Spontini fight to close down the airport at night?

Sophie Goldberg lives in a pleasant part of San Fernando, a large city with its share of traffic and parking problems. She has to fight every day, in fact, to get from her home to work, a mile away. Then she has a problem finding a parking place when she gets home.

For some time now, she has been reading about plans for building a freeway a mile from where she lives. This freeway would help people who want to drive into and out of the city from the suburbs. The proposed location would go through part of a beautiful old park near her home. In addition, she feels that the freeway will bring more cars into the city, create more parking problems and more air pollution.

People who want the highway say that it will decrease travel time and cause less air pollution on local streets. City officials want the highway because it will encourage new industry to locate there and make it easier for people from the suburbs to shop in the downtown stores. The city needs the money from the people from the suburbs in sales taxes and purchases. Without a freeway, these people will go to the local shopping centers rather than travel by slow routes into the city.

Should Ms. Goldberg oppose the highway? Why?

Robert Hernandez lives in Littleville, a small town about forty miles from "the big city," North Neon. He likes his quiet countryside, free of air pollution and noise and lots of people.

However, he has just learned from the newspaper that the State Highway Department, with Federal assistance, plans to build a part of Interstate 44 just one mile outside of Littleville. In order to locate the highway there, a bridge will have to be built over the best troutfishing stream in the county. Most important, the exit at Littleville threatens to change the town from a quiet rural village to a big suburb.

People who want the highway say that users will save time by having a fast route across the county and there will be fewer accidents than on the slower, windy roads people have to use now.

Should Robert Hernandez oppose or support the highway? Why?

(contd.)

SPIRIT MASTER #5: (CONTD.) FOR USE
WITH ACTIVITIES #6, #20, #27 AND #29

Hilda LeClair lives on Pleasant Street, a two-lane suburban street lined with trees and houses. There are quite a few children and dogs in the neighborhood who play outdoors and run from one yard to another. Unfortunately, Pleasant Street is an easy connection between two main highways and huge trucks drive down the street from dinnertime until morning.

The truck noise is disturbing and Hilda LeClair and her children are having difficulty sleeping. The trucks spray dirt on the house and they even make the house shake. When summer comes, it will be dangerous for the children to play outdoors after dinner.

When Hilda called the office of the largest truck company to complain, she was told that the truckers need to use Pleasant Street because it saves time--and that saves everyone money on the goods the truckers are carrying.

Ms. LeClair is not satisfied with this result. *What should she do? Why?*

The state of Liveitup is holding its annual hearings on whether to outlaw or restrict highway advertising. Ron Smith is uncertain about what to do at the hearings. Business people argue that the signs are necessary to attract tourists to the places of recreation and to provide them with information about what events are taking place, where to eat, and where to find hotels and motels. The tourist trade appears to reduce taxes on residents because of the money the tourists spend. In addition, the tourist business provides jobs for many people in the state.

On the other hand, the signs sometimes cause accidents by distracting drivers from their driving tasks and, in addition, are an eyesore to many residents and tourists alike.

Should Mr. Smith support a ban or restriction on roadside advertisements? Why?

SPIRIT MASTER #6: FOR USE WITH ACTIVITY #15

Instructions to Students

Imagine that you were flying from London to Australia last year and your plane crashed in the wilderness. You survived the crash and found your way to a large city in some foreign land. You were taken to a hospital, treated, and released. While waiting for the next stagecoach to take you over the mountains, you thought about something you had been struck by the moment you crashed in the country: there were no cars. Everyone traveled around by horseback, bicycle, and foot. You said to yourself, "If I could interest a car dealer in the U.S. to sell cars here, we could make a fortune."

Much later, you were indeed able to persuade a car company to agree to sell small cars to Smogfree, the country into which you had crashed. So the company sent you back to Smogfree to persuade the rulers to allow cars to be introduced. After some negotiations, Smogfree agreed to let cars be introduced--but on one condition. You had to become Minister of Automobiles in Smogfree and make sure that the country was *ready* to handle cars *before* any cars actually arrived.

The rulers of Smogfree are now giving you a free hand to do whatever needs to be done to get the country prepared for and able to handle a large number of cars. But these rulers have let you know that if the cars create any serious problems, you will be executed. You decide to stay and make your fortune.

You are now sitting down to plan what needs to be built and created in Smogfree to make it easy for the capital city and the rest of the country to accommodate cars.

What do you need to build in Smogfree to handle cars? What problems will cars create that you should plan for now?

SPIRIT MASTER #7: FOR USE WITH ACTIVITY #21

CHECK SHEET

Features / Type of Alternate Transportation	Bus	Train	Subway	Taxi	Ferry	Light Rail (Trolly)	Carpool
1. Convenience							
Hours							
Departure points							
Destination (stops)							
2. Safety							
Crime							
Traffic accidents							
Pollution							
3. Expense							
High or low							
Compared to automobile							
Compared to other pt*							
4. Speed							
Frequency of runs							
Absolute travel speed							
Speed relative to car							
Speed relative to other pt*							
5. Comfort							
Seating							
Crowding							
Air conditioning/heat							
6. Privacy							
During rush hour							
Off hour							
7. Social benefits							
Energy use							
Air noise/pollution							

*pt=public transportation

SPIRIT MASTER #8: FOR USE WITH ACTIVITY #24

Sample Instructions to Students

Read the following paragraph, which is *not* a true story, and answer the questions at the end of it as honestly as possible.

> The energy and pollution crises have become worse, the President announced on a special television broadcast to the nation yesterday. As a result, he is asking citizens to voluntarily give up driving their cars on Sundays except for essential purposes, such as going to work or to the hospital. However, he is not asking for laws to prohibit Sunday travel; he wants citizens to agree *voluntarily*. He encouraged citizens to make greater use of bicycles, walking, and public transportation.
>
> Tomorrow is the first Sunday since the President's speech. However, Sunday has been a very good day for you to visit relatives and attend sporting events, and you had planned to do both tomorrow. You know that there will be enough drivers on the road going to jobs, engaged in other essential tasks, and ignoring the President's recommendations so that you could probably drive too and not be noticed. Will you, then, follow the President's request? (Check answer below.)

Yes:_____ *No*:_____ *Unsure*:_____

If you said "Yes," *why* will you abide by the President's request? If you said "No" or "Unsure," or said "Yes," but only *reluctantly*, *why* are you unwilling or reluctant to conform to the President's request? (Write reasons below.)